

Health Care Financing

Research Report

End Stage Renal Disease, 1992



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Department of Health and Human Services
Health Care Financing Administration
Bureau of Data Management and Strategy

Health Care Financing

Research Report

The Health Care Financing Administration (HCFA) was established to combine health care financing and quality assurance within a single agency. HCFA is responsible for the Medicare program, Federal participation in the Medicaid program, and a variety of other health care quality assurance programs.

The mission of HCFA is to promote the timely delivery of appropriate, quality health care to the beneficiaries of its programs—approximately 67 million of the Nation's aged, disabled, and poor. The agency must also ensure that program beneficiaries are aware of the services for which they are eligible, that those services are accessible and of high quality, and that agency policies and actions promote efficiency and quality within the total health care delivery system.

The Bureau of Data Management and Strategy (BDMS) operates HCFA's statistical data systems and maintains the national Medicare statistical files. BDMS also serves as the focal point within the agency for information systems policy, planning, and data standards development.

The Office of Research and Demonstrations (ORD) conducts studies and projects that demonstrate and evaluate optional reimbursement, coverage, eligibility, and management alternatives to the present Federal programs. In addition, ORD examines the impact of HCFA programs on health care status, utilization, and expenditures, as well as their effect on beneficiary access to services, health care providers, and the health care industry.

Health Care Financing Research Reports present the results of major studies and projects conducted by HCFA program staff. These reports contain significant findings that affect HCFA programs and are used as the basis for making program changes.

The *End Stage Renal Disease Research Report, 1992* reflects a wide range of data and analyses regarding the Medicare end stage renal disease program. This report emphasizes trends and comparisons over time, making it a standard reference source for illustrating changes in the nature of the Medicare end stage renal disease population and for examining the pattern of treatment for these patients.

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End Stage Renal Disease, 1992

**Department of Health and Human Services
Health Care Financing Administration
Bureau of Data Management and Strategy
Office of Research and Demonstrations
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End stage renal disease, 1992

Introduction

With the enactment of section 299I of Public Law 92-603 (1972 Amendments to the Social Security Act), full Medicare coverage was extended to persons with end stage renal disease (ESRD), effective July 1, 1973. To be eligible for Medicare benefits, the patient must first be currently or fully insured, or be eligible for Social Security benefits, or be the spouse or dependent child of such a person. Additionally, a physician must certify that the individual requires chronic dialysis or a kidney transplant to maintain life.

The Medicare program pays a prospectively determined amount for kidney transplants, for certain drug treatments, and a composite rate schedule for dialysis services. For example, immunosuppressive drugs prescribed for transplant recipients are covered by Medicare for 1 year following discharge from the hospitalization for the transplant. Recent legislative changes, through the Omnibus Reconciliation Act of 1993 (OBRA 93), have impacted on the coverage of immunosuppressives for transplant patients. Beginning January 1, 1995, immunosuppressive drugs are covered by Medicare for 18 months following discharge for transplantation. By the year 1998, coverage for immunosuppressive drugs will be extended for 36 months after discharge.

The drug, erythropoietin (EPO), used to combat anemia, was added to Medicare coverage effective June 1, 1989. OBRA 93 has also had an impact on the coverage of EPO for dialysis patients. Effective January 1, 1994, Medicare coverage for the self-administration of EPO was extended to all dialysis patients regardless of dialysis setting. Self-administration of EPO was previously limited to home dialysis patients only.

The Health Care Financing Administration (HCFA) is charged with the effective administration of Medicare benefits to eligible persons with ESRD. Integral to the effective management of the ESRD program is the operation of a comprehensive data base covering medical and demographic information for the Medicare ESRD population. This data base, along with other ESRD program-related data, is contained within the ESRD Program Management and Medical Information System (PMMIS). This system, as required by Public Law 95-292, section (c)(1)(A), is designed to serve the needs of the Department of Health and Human Services in support of program analysis, policy development, and epidemiological research. The ESRD PMMIS includes information on both Medicare ESRD beneficiaries and Medicare-approved ESRD hospitals and dialysis facilities.

The principal sources of beneficiary-specific information are the Medicare billing records and incidence-specific medical information forms that report onset of ESRD, characteristics and status of a kidney transplant, and cause of death for an ESRD beneficiary. The principal sources of hospital and facility information are the Online Survey Certification and Reporting System (OSCAR), Medicare certification approval notices, and an annual survey of these organizations.

Legislation passed in 1986 mandated the establishment of a national ESRD patient registry. This registry, the United States Renal Data System (USRDS), is operated by a Coordinating Center (CC). The CC is currently the University of Michigan under contract with the National Institutes of Health (NIH). The USRDS is managed through the cooperative efforts of HCFA and NIH. Further, there are two major advisory committees which are composed of representatives from Federal agencies and professionals from the renal community; these are the Executive Committee and the Scientific Advisory Committee. Also, the Department of Health and Human Services (DHHS) has established the ESRD Data Advisory Committee to provide advice to the Secretary of DHHS in the formulation of policies and procedures relevant to the management, collection, and analyses of ESRD data.

The ESRD PMMIS, maintained by HCFA, provides the foundation data for the USRDS. However, the ESRD networks, under contract to HCFA, collect and provide additional data to the USRDS CC for the conduct of focused studies on the causes, progression, and treatment of ESRD. The CC disseminates a variety of reports based on these studies.

HCFA recognizes the need to disseminate the information developed from the ESRD PMMIS data and any resulting analyses of these data as promptly as possible. The purpose of this report is to present, in a single volume, statistics concerning recent trends in ESRD treatment and detailed discussions of selected health issues involving the ESRD population. Several of the tables in this report emphasize trends and comparisons over time, making this report a standard reference on the Medicare ESRD population and on ESRD treatment patterns.

Data which have been released to HCFA from other organizations (e.g., the Department of Veterans Affairs, the Centers for Disease Control, the European Dialysis and Transplantation Association, the Australia and New Zealand Dialysis and Transplant Registry, and the Canadian Renal Failure Register) have been included and identified where appropriate.

Incidence and enrollment

Program incidence

Trends in Medicare ESRD program incidence (that is, the count of new enrollees), from 1986 to 1991 are described in this section. The new Medicare ESRD population is presented by age, sex, race, primary diagnosis for renal failure, and State in the accompanying tables, along with some comparative data gathered from other Western countries on their ESRD populations.

The total counts of new Medicare ESRD beneficiaries by age, sex, race, and primary diagnosis are shown in Table 1. In 1986, 32,061 persons were added to the Medicare enrollment files as ESRD beneficiaries. By 1991, the number of new ESRD beneficiaries increased to 50,831 representing an average annual increase of 9.7 percent. The increase from 1990 to 1991 was 8.9 percent, almost 1 percentage point lower than the 5-year average.

Older persons, in particular those over 65 years of age, comprised the largest and fastest growing age group of ESRD beneficiaries with the 65-74 years of age group comprising 27.7 percent of new enrollees in 1991. The largest average annual rate of growth was for persons 75 years of age or over (15.7 percent). This same age group also experienced the largest percentage increase from 1990 to 1991 (14.3 percent). Enrollees through the age of 24 years experienced a combined decrease of 2.1 percent from 1990 to 1991. The under 15 to 24 years of age group experienced the largest decrease for this time period (2.3 percent).

The average annual rate of increase was a full percentage point greater for females (10.2 percent) than for males (9.2 percent). The percentage of the total of new enrollees for women has remained constant in each of the years, 1987 through 1989 (45.6 percent), but rose slightly in 1991 to 46.2 percent. The percent change from 1990 to 1991 was 2.5 percentage points higher for females (10.3 percent) than for males (7.8 percent).

Black and white persons, together, made up 95.2 percent of new enrollees in 1991. However, the average annual rates of growth were higher for both Asian persons (15.3 percent) and for American Indians (12.8 percent) than for either white persons (9.2 percent) or black persons (10.2 percent).

In terms of diagnoses, the average annual rate of growth was highest for those persons whose renal failure was attributed to diabetes (14.1 percent) and second highest for those whose renal failure was attributed to hypertension (12.7 percent). Diabetics and persons with hypertension represented the largest proportion of 1991 new enrollees together representing 64.7 percent of total program additions.

The "not reported" category appearing in this table, and all subsequent tables displaying primary diagnosis information, represents those patients who were added to the Program Management and Medical Information System file via the Health Insurance Master File. Primary diagnosis information is not available from the Health Insurance Master File, but only from the Chronic Renal

Disease Medical Evidence Report, HCFA-2728, which was not submitted for those patients appearing in the "not reported category."

Medicare ESRD program incidence expressed in terms of rates per million population is shown in Table 2. From 1986 to 1991, program incidence increased from 134 enrollees per million persons to 203 enrollees per million persons, representing an average annual rate of increase of 8.7 percent. Incidence rates are strongly related to age. In 1991, these rates ranged from 8 enrollees per million persons in the under 15 years of age group to 768 enrollees per million persons in the 65 to 74 years of age group. Males had a higher incidence rate (224 enrollees per million) than did females (182 enrollees per million). Black persons had the highest incidence rate (477 enrollees per million), followed by American Indians (309 enrollees per million), white persons (169 enrollees per million), and Asian persons (138 enrollees per million). In terms of diagnoses, diabetics and persons with hypertension comprised the highest incidence rates of 73 and 58 enrollees per million population, respectively.

Medicare ESRD program incidence per million population is shown by State in Table 3. The overall trend of increasing rates of incidence is reflected in this table for individual States. Of the 50 States and the District of Columbia, all had higher program incidence rates in 1991 than in 1986. In 1986, only the District of Columbia had an incidence rate greater than 200 enrollees per million persons. In contrast, 22 States, including the District of Columbia, had incidence rates greater than 200 enrollees per million persons in 1991. Only Alaska had an incidence rate below 100 in 1991.

Variations by State in Medicare ESRD average program incidence for the years 1986 through 1991 are illustrated in Table 4, with adjustments for age, sex, and race. Incidence rates per million are averaged across the 6 years from 1986 to 1991 to make the estimates more stable. Also, the States are ranked from highest to lowest incidence rates. Information on the unadjusted rates is shown in the first two columns and rates as adjusted for age, sex, and race are shown in the last two columns (adjusted with the indirect method). During this period (1986 to 1991), the U.S. average unadjusted incidence rate was 166 enrollees per million (calculated from Table 3). The individual State average unadjusted rates ranged from a high of 374 enrollees per million in the District of Columbia to a low of 70 enrollees per million in Alaska. Adjusting for age, sex, and race narrowed the range of incidence rates per million population. After adjustment, the individual rates ranged from a high of 201 enrollees per million in the District of Columbia to a low of 91 enrollees per million in Alaska. The District of Columbia, where black persons comprise 65.8 percent of the total population, had an adjusted incidence rate of 201 enrollees per million, which is 46.3 percent lower than its unadjusted rate. Conversely, Utah, where the black population is 0.7 percent of the total, had an adjusted rate of 142 enrollees per million, which is 46.4 percent higher than its

unadjusted rate of 97 enrollees per million.

Incidence rates per million population for the years from 1986 to 1991, for a number of countries that have ESRD registries, including the United States, are presented in Table 5. These rates represent not only a difference in underlying renal failure but in the medical and economic environments in the various countries as well. In 1991, the incidence rates per million persons for countries other than the United States ranged from the low of 26 per million in Poland to the high of 106 per million in Israel.

Most of the countries shown in Table 5 experienced increases in the incidence of treated renal disease between 1986 and 1991. Eight of the countries experienced growth rates in excess of 10 percent per year. Hungary experienced the highest average annual percent increase of 23 percent. Denmark and Luxembourg experienced a decrease in incidence (3.2 and 1.4 percent, respectively). Due to the high incidence rate among black persons, the total United States incidence rate is not comparable to European countries, which have much smaller black populations. However, in 1991, even the incidence rate among white persons in the United States was much higher than those of European countries. The white incidence rate of 138 per million population in the United States was 30 percent greater than the incidence rate of any of the other countries listed in Table 5.

Tables 6 and 7 show the distribution of patients by treatment category at 30 days after renal failure (Table 6) and at 1 year following renal failure (Table 7). Patients who select a home dialysis modality are required to fill out the home dialysis selection form (HCFA-382). The data from this form were used to determine whether or not the patient was dialyzing at home. If the patient received a transplant within the time frame, either 30 days or 1 year, and had not experienced a graft failure, then the patient was included in the transplant category. If the patient had not selected a home dialysis modality and did not have a functioning kidney graft and had not died, then the patient was assumed to be on in-facility dialysis.

Between 1987 and 1991, there were 208,921 persons who experienced renal failure and were Medicare entitled. By the end of the first month of renal failure (or Medicare entitlement), 86 percent of patients were receiving in-facility dialysis (see Outpatient, Table 6). The second most common modality was continuous ambulatory peritoneal dialysis (CAPD) at 8 percent. Only 2 percent of patients had a functioning kidney transplant by the end of 30 days, and 2 percent of the patients had died.

Modality selection was significantly related to age at the time of renal failure. Fifty-nine percent of pediatric patients under 15 years of age were on in-facility dialysis after 1 month. In all other age groups, 77 percent or more of the patients were on in-facility dialysis after 1 month. Seventeen percent of pediatric patients had a functioning graft by that time; while 9 percent or fewer of the patients in the other age groups had a functioning graft at 30 days. Transplantation as the initial modality decreased rapidly with age, accounting for less than 1 percent of all patients over age 65. There were no significant differences in initial modality by sex. These data show that CCPD was not frequently used by any age group other than the pediatric patients. The percentage of patients in the under

15 years of age group who were on Continuous Cycling Peritoneal Dialysis (CCPD) (14 percent) was seven times greater than the use of CCPD in any of the other age groups, which ranged from 2 percent in the 15-24 years of age group to 1 percent in patients 55 years of age and over. The use of CAPD was somewhat more consistent across age groups, ranging from a low of 5 percent in the 75 years of age and over group to 12 percent in the 25-34 years of age group.

American Indians and whites had lower rates of in-facility dialysis (85 percent and 83 percent, respectively) than did Asians and blacks (both at 91 percent). The differences were accounted for by higher rates of CAPD by American Indians (10 percent) and whites (9 percent). There were no large differences in initial modality by cause of renal failure. However, patients whose renal failure was attributed to polycystic kidney disease were most likely to receive a transplant (6 percent) and those with hypertension were least likely to receive a transplant (less than 1 percent).

Patient status at the end of 1 year following renal failure (or date of Medicare entitlement) is shown in Table 7. Most of the changes in the distribution of patients were due to transplantation or death. By the end of 1 year, death had decreased the initial cohort by 23 percent. Fifty-eight percent of the initial cohort remained on in-facility dialysis by the end of 1 year. CAPD remained relatively constant at 9 percent of the initial cohort, while persons with a functioning graft increased to 7 percent.

The effect of mortality was very pronounced by age. Six percent of the pediatric population (under 15 years of age) and 4 percent of the young adult population (15-24 years of age) died, while 31 percent of persons 65 to 74, and 42 percent of persons 75 years of age and over died during the first year of ESRD. Only 28 percent of pediatric patients remained on in-facility dialysis by the end of one year. Forty-five percent had a functioning graft with most of the remaining pediatric patients on CAPD (7 percent) or CCPD (12 percent). For other age groups, the percent of patients on in-facility dialysis ranged from 48 percent for persons 15 to 24 years of age, to 64 percent for persons 55 to 64 years of age. Transplantation decreased rapidly with age. Only 3 percent of persons 55 to 64 years of age, and less than 1 percent of persons 65 years of age and over, had a functioning graft after 1 year.

Other demographic differences in mortality, use of CAPD, and transplantation also became more evident by 1 year following renal failure. A higher percentage of males than females had functioning kidney grafts at 1 year (8 percent and 6 percent, respectively). Asians (9 percent), whites (9 percent), and American Indians (7 percent) were most likely to have a functioning graft at one year, while only 3 percent of blacks had a successful kidney transplant. Whites had the highest mortality rate at 26 percent with other racial groups in the 16 and 17 percent range. American Indians and whites (11 percent and 10 percent, respectively) were most likely to use CAPD. The rate of home hemodialysis among American Indians (3 percent) was three times as high as any other racial group.

Table 1

Medicare end stage renal disease program incidence, by age, sex, race, and primary diagnosis: 1986-91

Age, sex, race, and primary diagnosis	1986	1987	1988	1989	1990	1991	Percent 1991	Average annual percent change	Percent change 1990-91
Number of new enrollees									
Total	32,061	35,081	38,151	42,885	46,658	50,831	100.0	9.7	8.9
Age									
Under 15 years	420	430	403	405	461	454	0.9	1.6	-1.5
15-24 years	1,188	1,247	1,268	1,315	1,271	1,242	2.4	.9	-2.3
25-34 years	2,992	2,852	3,087	3,413	3,438	3,485	6.9	3.1	1.4
35-44 years	3,659	3,989	4,340	4,704	5,133	5,501	10.8	8.5	7.2
45-54 years	4,450	4,893	5,390	5,904	6,230	6,753	13.3	8.7	8.4
55-64 years	7,217	7,885	8,456	9,108	9,819	10,587	20.8	8.0	7.8
65-74 years	7,937	8,972	9,669	11,302	12,682	14,097	27.7	12.2	11.2
75 years or over	4,198	4,813	5,538	6,734	7,624	8,712	17.1	15.7	14.3
Sex									
Male	17,605	19,072	20,727	23,294	25,381	27,371	53.8	9.2	7.8
Female	14,456	16,009	17,424	19,591	21,277	23,460	46.2	10.2	10.3
Race									
Asian	519	575	679	806	999	1,057	2.1	15.3	5.8
Black	8,884	9,922	10,825	12,307	13,175	14,471	28.5	10.2	9.8
White	21,878	23,681	25,546	28,660	31,144	33,898	66.7	9.2	8.8
American Indian	340	350	465	531	570	622	1.2	12.8	9.1
Other/unknown	440	553	636	581	770	783	1.5	12.2	1.7
Primary diagnosis									
Diabetes	9,434	10,488	11,717	14,214	15,939	18,249	35.9	14.1	14.5
Glomerulonephritis	4,717	4,958	5,228	5,643	5,779	5,810	11.4	4.3	0.5
Hypertension	8,049	9,221	10,325	12,161	13,278	14,633	28.8	12.7	10.2
Polycystic kidney disease	1,225	1,248	1,250	1,275	1,402	1,474	2.9	3.8	5.1
Interstitial nephritis	1,355	1,240	1,233	1,378	1,371	1,497	2.9	2.0	9.2
Obstructive nephropathy	846	839	872	954	916	985	1.9	3.1	7.5
Other	1,879	2,016	2,182	2,596	2,788	3,456	6.8	13.0	24.0
Unknown	2,349	2,804	2,657	2,443	2,408	2,693	5.3	2.8	11.8
Not reported	2,207	2,267	2,687	2,221	2,777	2,034	4.0	-1.6	-26.8

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1993 update, 1986-91.

Mortality and treatment patterns by diagnostic category largely reflected underlying age and racial distributions. Patients whose renal failure was attributed to obstructive nephropathy had the highest mortality rate at 27 percent, and transplant rates of 7 percent. The experience of those with diabetes as their primary diagnosis was similar to those with obstructive nephropathy with a mortality rate of 24 percent and a transplantation rate of 6 percent. Patients whose renal failure was attributed to hypertension also had a high mortality rate of 27 percent but a low transplant rate

of 3 percent. These rates reflect the higher distribution and greater concentration of blacks in this diagnostic category who are less likely to receive a transplant, and an older age distribution, which increases the mortality rate. The high rate of transplantation (19 percent with a functioning graft) and the low mortality rate (8 percent) among persons whose renal failure was attributed to polycystic kidney disease is probably reflective of their youth and relatively better health status.

Table 2
Medicare end stage renal disease program incidence rates per million population,
by age, sex, race, and primary diagnosis: 1986-91

Age, sex, race, and primary diagnosis	1986	1987	1988	1989	1990	1991	Average annual percent change	Percent change 1990-91
Number of new enrollees per million population								
Total	134	145	156	174	188	203	8.7	8.0
Age								
Under 15 years	8	8	8	8	9	8	1.1	-1.9
15-24 years	30	32	33	35	35	34	2.4	-0.7
25-34 years	73	69	74	80	80	80	1.6	0.0
35-44 years	112	117	123	129	137	142	4.9	3.9
45-54 years	183	200	218	236	247	265	7.6	7.4
55-64 years	338	370	398	430	464	502	8.2	8.1
65-74 years	464	517	549	633	700	768	10.6	9.6
75 years or over	354	395	443	525	580	648	12.9	11.6
Sex								
Male	151	162	174	194	209	224	8.2	6.9
Female	117	129	139	155	167	182	9.2	9.3
Race								
Asian	90	94	104	117	137	138	8.9	0.6
Black	311	343	370	415	439	477	9.0	8.6
White	112	121	129	144	156	169	8.5	8.2
American Indian	195	195	251	279	291	309	9.6	6.2
Other/unknown	—	—	—	—	—	—	—	—
Primary diagnosis								
Diabetes	39	43	48	58	64	73	13.1	13.5
Glomerulonephritis	20	20	21	23	23	23	3.3	-0.4
Hypertension	34	38	42	49	53	58	11.7	9.2
Polycystic kidney disease	5	5	5	5	6	6	2.8	4.2
Interstitial nephritis	6	5	5	6	6	6	1.1	8.2
Obstructive nephropathy	4	3	4	4	4	4	2.2	6.6
Other	8	8	9	11	11	14	11.9	22.9
Unknown	10	12	11	10	10	11	1.8	10.8
Not reported	9	9	11	9	11	8	-2.5	-27.4

NOTE: Average annual percent change calculated by use of compounding.

SOURCES: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1993 update, 1986-91; and U.S. Department of Commerce, Bureau of the Census: Population Estimates and Projections. *Current Population Reports*. Series P-25, No. 998. Washington. U.S. Government Printing Office.

Table 3

Medicare end stage renal disease program incidence rates per million population, by State: 1986-91

State	1986	1987	1988	1989	1990	1991
Number of new enrollees per million population						
United States	131	142	153	171	184	199
Alabama	143	167	189	214	207	239
Alaska	73	53	61	78	69	81
Arizona	146	151	160	178	181	206
Arkansas	118	151	161	161	172	209
California	136	142	145	164	176	183
Colorado	104	99	104	127	117	133
Connecticut	137	152	146	173	175	200
Delaware	138	166	187	208	204	235
District of Columbia	278	318	298	413	465	477
Florida	170	187	190	206	219	237
Georgia	154	170	176	204	209	245
Hawaii	165	199	195	192	242	237
Idaho	87	85	97	127	139	126
Illinois	140	150	153	175	196	216
Indiana	109	127	150	151	168	182
Iowa	111	100	116	131	147	155
Kansas	102	110	122	148	151	163
Kentucky	109	120	131	139	161	187
Louisiana	168	181	200	233	242	270
Maine	86	98	91	89	113	106
Maryland	128	158	163	186	218	231
Massachusetts	108	108	120	140	144	162
Michigan	125	132	151	176	185	196
Minnesota	98	119	117	127	143	146
Mississippi	150	164	187	199	217	233
Missouri	130	148	151	170	188	207
Montana	87	101	90	135	139	162
Nebraska	95	108	122	136	141	156
Nevada	144	128	146	148	135	185
New Hampshire	77	104	105	118	121	121
New Jersey	164	171	180	200	223	240
New Mexico	117	129	160	153	165	212
New York	134	138	155	168	187	191
North Carolina	138	158	168	195	202	229
North Dakota	109	96	112	158	158	141
Ohio	124	134	155	163	178	189
Oklahoma	113	121	149	154	186	168
Oregon	107	111	123	140	139	170
Pennsylvania	148	149	168	180	210	212
Puerto Rico	116	127	136	152	154	165
Rhode Island	102	118	136	159	182	202
South Carolina	169	178	195	230	245	259
South Dakota	95	138	128	124	126	145
Tennessee	124	148	147	189	193	220
Texas	133	146	164	179	195	209
Utah	85	84	104	100	106	102
Vermont	66	91	94	106	116	150
Virginia	127	148	158	171	186	217
Washington	97	99	105	130	137	144
West Virginia	122	133	161	152	168	195
Wisconsin	103	123	136	152	154	170
Wyoming	54	74	105	97	75	108

SOURCES: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1993 update, 1986-91; and U.S. Department of Commerce, Bureau of the Census: Population Estimates and Projections. *Current Population Reports*. Series P-25, No. 998. Washington. U.S. Government Printing Office.

Table 4
Average Medicare end stage renal disease program incidence rates
per million population, by State: 1986-91

State	Unadjusted		Age, sex, race, adjusted	
	Rate	Rank	Rate	Rank
Number of new enrollees per million population				
Alabama	193	8	170	11
Alaska	70	52	91	51
Arizona	171	16	176	8
Arkansas	162	22	151	30
California	158	24	152	29
Colorado	114	45	135	44
Connecticut	164	20	169	12
Delaware	190	10	188	5
District of Columbia	374	1	201	1
Florida	202	5	174	9
Georgia	194	7	186	6
Hawaii	206	4	117	48
Idaho	110	46	135	43
Illinois	172	15	167	16
Indiana	148	31	163	22
Iowa	127	39	141	40
Kansas	133	35	144	36
Kentucky	141	33	157	28
Louisiana	215	2	195	2
Maine	97	49	115	49
Maryland	181	12	166	18
Massachusetts	130	37	141	39
Michigan	161	23	166	17
Minnesota	125	42	150	31
Mississippi	192	9	161	24
Missouri	166	19	168	15
Montana	119	43	134	45
Nebraska	126	40	142	38
Nevada	148	30	157	27
New Hampshire	108	47	136	42
New Jersey	197	6	194	3
New Mexico	157	26	161	23
New York	162	21	145	35
North Carolina	182	11	168	13
North Dakota	129	38	148	32
Ohio	157	25	163	21
Oklahoma	149	29	146	33
Oregon	132	36	146	34
Pennsylvania	178	13	173	10
Puerto Rico	142	32	—	—
Rhode Island	150	28	160	25
South Carolina	213	3	191	4
South Dakota	126	41	139	41
Tennessee	170	17	168	14
Texas	172	14	179	7
Utah	97	50	142	37
Vermont	104	48	131	47
Virginia	168	18	164	20
Washington	119	44	133	46
West Virginia	155	27	166	19
Wisconsin	140	34	159	26
Wyoming	86	51	109	50

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1993 update, 1986-91.

Table 5

New end stage renal disease patients per million population, for selected countries: 1986-91

Country	1986	1987	1988	1989	1990	1991	Average annual percent increase	Percent change 1990-91
Number of patients per million population								
Total EDTA¹	37	41	42	45	44	48	5.1	9.8
Austria	70	77	96	89	101	105	8.5	4.2
Belgium	74	76	85	77	97	87	3.2	-10.3
Bulgaria	33	38	30	38	40	50	8.8	24.5
Czechoslovakia	27	29	33	39	46	56	15.6	20.3
Denmark	56	48	53	54	52	48	-3.2	-8.3
Federal Republic of Germany	66	85	77	84	79	94	7.4	18.8
Finland	41	47	49	47	49	54	5.8	10.3
France	44	58	56	70	57	77	11.9	36.5
German Democratic Republic	35	38	43	42	61	63	12.3	2.6
Greece	54	58	59	53	75	71	5.5	-6.4
Hungary	16	21	24	28	42	45	23.0	8.4
Iceland	37	57	29	16	60	50	6.4	-15.3
Ireland	33	36	34	29	42	48	7.9	13.7
Israel	58	70	80	67	115	106	12.9	-7.3
Italy	49	49	55	54	50	54	1.9	7.8
Luxembourg	85	66	87	32	71	79	-1.4	12.6
Netherlands	48	44	65	56	69	60	4.6	-12.4
Norway	59	43	53	51	67	65	2.0	-2.7
Poland	13	16	15	20	19	26	15.0	35.2
Portugal	50	49	43	49	75	86	11.3	14.5
Spain	51	50	57	56	60	60	3.1	-0.5
Sweden	60	56	64	50	66	100	10.7	50.2
Switzerland	65	62	62	66	77	96	8.0	24.2
United Kingdom	47	51	55	32	61	60	4.9	-1.6
Yugoslavia	36	39	43	47	44	49	6.3	10.1
Australia	45	49	49	53	56	55	4.1	-1.8
New Zealand	37	46	46	52	53	59	9.8	11.3
Canada	68	71	75	80	86	95	6.9	10.5
United States ²	134	145	156	174	188	203	8.7	8.2
Asian	112	121	129	144	156	169	8.5	8.2
Black	311	343	370	415	439	477	9.0	8.6
White	90	94	104	117	137	138	8.9	0.6
American Indian	195	195	251	279	291	309	9.6	6.2

¹European Dialysis & Transplant Association²Includes only Medicare entitled end stage renal disease (ESRD) patients. Of all ESRD patients in the United States, it is estimated that 7 to 10 percent are not Medicare eligible.

SOURCES: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1993 update, 1986-91; European Dialysis and Transplant Association (EDTA) Combined Report on Regular Dialysis and Transplantation in Europe, 1986-91; Canadian Renal Failure Register, 1991; The Fourteenth Annual Report on the Australia and New Zealand Dialysis and Transplant Registry, 1991.

Table 6
Medicare end stage renal disease program incidence modality, by age, sex, race,
and primary diagnosis, patients' status at 30 days: 1987-91

Age, sex, race, and primary diagnosis	Total patients	Percent total	Outpatient	Home hemodialysis	CAPD ¹	CCPD ²	Other	Transplant	Death
Percent of patients									
Total	208,921	100	86	1	8	1	*	2	2
Age									
Under 15 years	2,092	100	59	1	8	14	1	17	1
15-24 years	6,096	100	77	1	10	2	*	9	*
25-34 years	15,706	100	78	1	12	2	*	7	1
35-44 years	22,747	100	80	1	11	2	*	5	1
45-54 years	27,994	100	85	1	10	1	*	2	1
55-64 years	44,195	100	87	1	8	1	*	1	2
65-74 years	56,680	100	89	1	7	1	*	*	3
75 years or over	33,411	100	89	1	5	1	*	*	4
Sex									
Male	113,230	100	85	1	8	1	*	2	2
Female	95,691	100	86	1	8	1	*	2	2
Race									
Asian	3,999	100	91	*	5	1	*	2	1
Black	58,997	100	91	1	6	1	*	1	1
White	140,289	100	83	1	9	1	*	3	2
American Indian	2,471	100	85	3	10	1	*	1	1
Other/unknown	3,165	100	92	1	4	1	*	1	2
Primary diagnosis									
Diabetes	69,046	100	86	1	9	1	*	1	2
Glomerulonephritis	26,750	100	82	1	10	2	*	3	1
Hypertension	58,665	100	89	1	7	1	*	*	2
Polycystic kidney disease	6,478	100	80	1	11	2	*	6	1
Interstitial nephritis	6,588	100	84	1	9	1	*	3	1
Obstructive nephropathy	4,490	100	88	1	5	1	*	2	2
Other	12,645	100	84	1	7	2	0	3	3
Unknown	12,773	100	86	1	7	1	0	2	3
Not reported	11,486	100	82	1	6	1	0	7	2

¹Continuous ambulatory peritoneal dialysis

²Continuous cycling peritoneal dialysis.

* Less than 1 percent.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1993 update, 1987-91.

Table 7
Medicare end stage renal disease program Incidence, modality, by age, sex, race,
and primary diagnosis, patients' status at 1 year: 1987-91

Age, sex, race, and primary diagnosis	Total patients	Percent total	Outpatient	Home hemodialysis	CAPD ¹	CCPD ²	Other	Transplant	Death
Percent of percent total									
Total	208,921	100	58	1	9	1	*	7	23
Age									
Under 15 years	2,092	100	28	0	7	12	2	45	6
15-24 years	6,096	100	48	1	10	3	*	33	4
25-34 years	15,706	100	50	1	13	2	*	25	9
35-44 years	22,747	100	55	1	13	2	*	18	10
45-54 years	27,994	100	62	1	12	2	*	10	13
55-64 years	44,195	100	64	1	10	1	*	3	20
65-74 years	56,680	100	59	1	7	1	*	*	31
75 years or over	33,411	100	52	1	4	1	*	*	42
Sex									
Male	113,230	100	56	1	9	1	*	8	23
Female	95,691	100	59	1	9	1	*	6	23
Race									
Asian	3,999	100	68	1	6	1	*	9	16
Black	58,997	100	70	1	7	1	*	3	17
White	140,289	100	52	1	10	1	*	9	26
American Indian	2,471	100	61	3	11	1	*	7	16
Other/unknown	3,165	100	71	1	5	1	*	3	17
Primary diagnosis									
Diabetes	69,046	100	58	1	9	1	*	6	24
Glomerulonephritis	26,750	100	55	2	12	2	*	15	15
Hypertension	58,665	100	61	1	7	1	*	3	27
Polycystic kidney disease	6,478	100	56	2	12	2	*	19	8
Interstitial nephritis	6,588	100	57	2	10	1	*	10	20
Obstructive nephropathy	4,490	100	58	1	5	1	*	7	27
Other	22,645	100	49	1	9	2	*	10	28
Unknown	12,773	100	56	1	9	1	*	7	25
Not reported	11,486	100	59	1	8	1	*	14	16

¹Continuous ambulatory peritoneal dialysis

²Continuous cycling peritoneal dialysis.

* Less than 1 percent.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1993 update, 1987-91.

Program enrollment

Trends in Medicare ESRD program total enrollment for the years 1986 to 1991 are described in this section. Tables are presented that show Medicare ESRD enrollment by age, sex, race, and primary diagnosis. Enrollment is broken into two groups of persons: those on dialysis and those with a functioning graft. Enrollment counts are taken as of December 31 each year and reflect the patients dialysis or transplant status as of that date. Medicare enrollment by dialysis and functioning graft patient groups for the years 1978 to 1991 is presented in Table 8. During this time, enrollment grew from 44,015 to 182,684 an average annual rate of increase of 11.6 percent. The number of patients on dialysis grew at a slightly slower rate of 10.4 percent per year (from 39,259 in 1978 to 142,510 in 1991). The number of patients with a functioning kidney graft increased at a faster annual rate of 17.8 percent (from 4,756 in 1978 to 40,174 in 1991). The rapid growth in patients with a functioning graft was due, in part, to increases in the number of transplants performed and, in part, to increased graft survival rates. As a result of these transplantation trends, patients with a functioning graft increased from 10.8 percent of the total Medicare ESRD population in 1978 to 22.0 percent in 1991. However, the increase in the functioning graft population from 1990 to 1991 was only 11.9 percent, reflecting the leveling of the number of transplants in the most recent years.

The Medicare dialysis patient population by age, sex, race, and primary diagnosis for the years 1986 to 1991 is shown in Table 9. The growth rate in the dialysis patient population has been greatest for persons 75 years of age or over, primarily as a result of the increase in program incidence rates shown in Tables 1 and 2. In 1986, persons 75 years of age or over accounted for 11.1 percent of the total dialysis patient population, increasing to 15.0 percent in 1991. The largest populations in absolute numbers were those in the two age groups between 55 and 74 years of age. Together these two groups accounted for 47.7 percent of the total dialysis patient population. In 1991, 52.4 percent of the Medicare dialysis population were male and 59.5 percent were white persons. The major diagnoses reported as primary causes of renal failure were diabetes (27.6 percent), hypertension (27.3 percent), and glomerulonephritis (14.8 percent).

Medicare dialysis patient population expressed as enrollment per million population is shown in Table 10.

Overall, dialysis patient enrollment increased from 389 per million population in 1986 to 568 per million in 1991—an average annual increase of 7.9 percent. Dialysis enrollment rates varied markedly with age, ranging (in 1991) from 14 per million for persons under 15 years of age to 2,056 per million for persons 65 to 74 years of age. Males had an enrollment rate per million that was 15.9 percent greater than that of females (611 per million and 527 per million, respectively). Dialysis patient enrollment for black persons was almost four times as great as for white persons (1,650 per million and 422 per million, respectively). Dialysis patient enrollment per million was lowest for Asians (374 per million) while Native Americans had a rate twice that of whites (854 per million).

The Medicare ESRD population with a functioning graft is presented in Table 11 by age, sex, race, and primary diagnosis for the years 1986 to 1991. The same population in terms of rates per million population is shown in Table 12. In contrast to the dialysis population, those patients with functioning grafts come largely from the younger age groups. Table 11 shows that, of patients with functioning grafts in 1986 and 1991, 86.4 percent and 79.1 percent, respectively, were under 55 years of age. The percent increase from 1986 to 1991 was greater for each of the three older age groups than for any of the other age groups. Taken together, the 55 years of age and older group increased at an annual rate of 22.7 percent from 1986 to 1991; the under 55 years of age group increased by only 10.5 percent per year over the same period. In 1991, 61.1 percent of the Medicare ESRD population with a functioning kidney graft were male and 77.7 percent were white persons. The major diagnoses reported as the primary cause for renal failure were glomerulonephritis (26.8 percent) and diabetes (19.7 percent).

In terms of rates per million population (Table 12), the ESRD functioning graft population increased from 93 per million in 1986 to 160 per million in 1991—an 11.5 percent annual rate of increase. In 1991, those persons 35 to 44 years of age, 45 to 54 years of age, and 55 to 64 years of age had the highest rates per million population (292 per million, 347 per million, and 290 per million, respectively). The rate was higher for males (201 per million) than for females (121 per million). The rate per million population was highest for black persons (238 per million) followed by Native Americans (214 per million), white persons (155 per million), and Asian persons (120 per million).

Table 8

Medicare end stage renal disease program enrollment, by dialysis and functioning graft: 1978-91

Year	Patients on dialysis		Patients with a functioning graft		All patients	
	Number	Percent	Number	Percent	Number	Percent
1978	39,259	89.2	4,756	10.8	44,015	100.0
1979	46,048	88.5	5,969	11.5	52,017	100.0
1980	52,701	88.0	7,171	12.0	59,872	100.0
1981	58,937	87.5	8,411	12.5	67,348	100.0
1982	65,982	86.6	10,232	13.4	76,214	100.0
1983	74,047	85.8	12,288	14.2	86,335	100.0
1984	80,594	84.3	15,052	15.7	95,646	100.0
1985	87,051	82.7	18,224	17.3	105,275	100.0
1986	93,197	80.7	22,303	19.3	115,500	100.0
1987	100,620	79.5	25,947	20.5	126,567	100.0
1988	108,574	79.0	28,929	21.0	137,503	100.0
1989	118,797	78.8	32,050	21.2	150,847	100.0
1990	129,991	78.4	35,886	21.6	165,877	100.0
1991	142,510	78.0	40,174	22.0	182,684	100.0
Average annual percent increase	—	10.4	—	17.8	—	11.6
1990-91 percent increase	—	9.6	—	11.9	—	10.1

NOTE: Enrollment is as of December 31 of each year and includes Medicare patients who are alive and currently entitled. Average annual percent increase calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1993 update, 1978-91.

Table 9

Medicare end stage renal disease program enrollment for dialysis patients, by age, sex, race, and primary diagnosis: 1986-91

Age, sex, race, and primary diagnosis	Number of patients						Percent 1991	Average annual percent increase	Percent change 1990-91
	1986	1987	1988	1989	1990	1991			
Total	93,197	100,620	108,574	118,797	129,991	142,510	100.0	8.9	9.6
Age									
Under 15 years	648	668	676	673	751	746	0.5	2.9	-0.7
15-24 years	2,711	2,778	2,885	3,060	3,145	3,183	2.2	3.3	1.2
25-34 years	7,979	8,227	8,723	9,334	9,853	10,279	7.2	5.2	4.3
35-44 years	11,732	12,523	13,498	14,813	16,224	17,622	12.4	8.5	8.6
45-54 years	14,501	15,242	16,464	18,137	19,436	21,456	15.1	8.2	10.4
55-64 years	21,999	23,302	24,533	25,909	27,977	30,157	21.2	6.5	7.8
65-74 years	23,296	25,717	27,880	30,775	34,138	37,755	26.5	10.1	10.6
75 years or over	10,331	12,163	13,915	16,096	18,467	21,312	15.0	15.6	15.4
Sex									
Male	49,124	52,713	56,704	62,083	68,110	74,746	52.4	8.8	9.7
Female	44,073	47,907	51,870	56,714	61,881	67,764	47.6	9.0	9.5
Race									
Asian	1,227	1,397	1,653	2,024	2,421	2,863	2.0	18.5	18.3
Black	31,196	34,234	37,303	41,202	45,366	50,039	35.1	9.9	10.3
White	57,836	61,805	66,044	71,705	77,880	84,825	59.5	8.0	8.9
American Indian	836	948	1,112	1,310	1,512	1,720	1.2	15.5	13.8
Other/unknown	2,102	2,236	2,462	2,556	2,812	3,063	2.1	7.8	8.9
Primary diagnosis									
Diabetes	18,179	21,007	24,118	28,690	33,491	39,269	27.6	16.7	17.3
Glomerulonephritis	15,948	16,926	17,810	19,032	20,138	21,133	14.8	5.8	4.9
Hypertension	22,133	24,859	27,469	31,036	34,662	38,850	27.3	11.9	12.1
Polycystic kidney disease	4,750	4,932	5,035	5,175	5,315	5,601	3.9	3.4	5.4
Interstitial nephritis	4,071	4,177	4,324	4,514	4,724	4,920	3.5	3.9	4.1
Obstructive nephropathy	3,034	3,052	3,128	3,215	3,249	3,387	2.4	2.2	4.2
Other	4,328	4,861	5,326	6,108	6,826	7,941	5.6	12.9	16.3
Unknown	7,568	8,277	8,702	8,780	8,924	9,193	6.5	4.0	3.0
Not reported	13,186	12,529	12,662	12,247	12,662	12,216	8.6	-1.5	-3.5

NOTE: All calculations are based on unrounded numbers. Average annual percent change calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1993 update, 1986-91.

Table 10
Medicare end stage renal disease program dialysis enrollment per million population,
by age, sex, race, and primary diagnosis: 1986-91

Age, sex, race, and primary diagnosis	1986	1987	1988	1989	1990	1991	Average annual percent change	Percent change 1990-91
Number of enrollees per million								
Total	389	416	444	482	523	568	7.9	8.7
Age								
Under 15 years	12	13	13	13	14	14	2.4	-1.1
15-24 years	69	72	76	82	86	88	4.8	2.8
25-34 years	196	199	208	219	228	235	3.7	2.9
35-44 years	358	368	384	407	432	454	4.9	5.3
45-54 years	598	622	666	726	771	843	7.1	9.3
55-64 years	1,029	1,093	1,154	1,222	1,323	1,430	6.8	8.1
65-74 years	1,363	1,482	1,584	1,724	1,885	2,056	8.6	9.1
75 years or over	870	998	1,113	1,256	1,406	1,584	12.7	12.7
Sex								
Male	421	447	476	517	562	611	7.7	8.7
Female	358	386	414	449	485	527	8.0	8.6
Race								
Asian	213	227	254	293	333	374	11.9	12.4
Black	1,091	1,183	1,274	1,390	1,513	1,650	8.6	9.0
White	296	315	335	361	390	422	7.3	8.3
American Indian	479	527	601	688	772	854	12.2	10.7
Other/unknown	—	—	—	—	—	—	—	—
Primary diagnosis								
Diabetes	76	87	99	116	135	156	15.6	16.2
Glomerulonephritis	66	70	73	77	81	84	4.8	4.0
Hypertension	92	103	112	126	139	155	10.9	11.1
Polycystic kidney disease	20	20	21	21	21	22	2.4	4.5
Interstitial nephritis	17	17	18	18	19	20	2.9	3.2
Obstructive nephropathy	13	13	13	13	13	13	1.3	3.3
Other	18	20	22	25	27	32	11.9	15.3
Unknown	32	34	36	36	36	37	3.0	2.1
Not reported	55	52	52	50	51	49	-2.4	-4.4

NOTE: All calculations are based on unrounded numbers. Average annual percent change calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1993 update, 1986-91.

Table 11

**Medicare end stage renal disease program enrollment for patients with functioning grafts,
by age, sex, race, and primary diagnosis: 1986-91**

Age, sex, race, and primary diagnosis	1986	1987	1988	1989	1990	1991	Percent 1990	Average annual percent change	Percent change 1990-91
Number of patients									
Total	22,303	25,947	28,929	32,050	35,886	40,174	100.0	12.5	11.9
Age									
Under 15 years	672	742	795	863	899	997	2.5	8.2	10.9
15-24 years	2,121	2,254	2,261	2,301	2,454	2,657	6.6	4.6	8.3
25-34 years	5,774	6,261	6,493	6,869	7,379	7,971	19.8	6.7	8.0
35-44 years	6,271	7,320	8,196	9,114	10,269	11,320	28.2	12.5	10.2
45-54 years	4,449	5,433	6,296	7,026	7,847	8,831	22.0	14.7	12.5
55-64 years	2,543	3,211	3,880	4,540	5,270	6,123	15.2	19.2	16.2
65-74 years	454	695	968	1,276	1,684	2,164	5.4	36.7	28.5
75 years or over	19	31	40	61	84	111	0.3	42.3	32.1
Sex									
Male	14,107	16,315	18,008	19,834	22,098	24,560	61.1	11.7	11.1
Female	8,196	9,632	10,921	12,216	13,788	15,614	38.9	13.8	13.2
Race									
Asian	351	457	547	649	789	918	2.3	21.2	16.3
Black	4,106	4,696	5,292	5,807	6,466	7,233	18.0	12.0	11.9
White	17,418	20,314	22,531	24,960	27,905	31,196	77.7	12.4	11.8
American Indian	196	235	278	324	374	430	1.1	17.0	15.0
Other/unknown	232	245	281	310	352	397	1.0	11.3	12.8
Primary diagnosis									
Diabetes	3,773	4,568	5,222	6,003	6,919	7,925	19.7	16.0	14.5
Glomerulonephritis	6,079	7,100	7,850	8,606	9,631	10,748	26.8	12.1	11.6
Hypertension	2,485	2,980	3,480	3,887	4,418	4,941	12.3	14.7	11.8
Polycystic kidney disease	1,324	1,670	2,013	2,271	2,632	2,963	7.4	17.5	12.6
Interstitial nephritis	954	1,125	1,246	1,384	1,546	1,764	4.4	13.1	14.1
Obstructive nephropathy	691	757	782	843	922	1,029	2.6	8.3	11.6
Other	1,401	1,649	1,920	2,203	2,505	2,849	7.1	15.3	13.7
Unknown	2,095	2,378	2,445	2,536	2,666	2,957	7.4	7.1	10.9
Not reported	3,501	3,720	3,971	4,317	4,647	4,998	12.4	7.4	7.6

NOTE: All calculations are based on unrounded numbers. Average annual percent change calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1993 update, 1986-91.

Table 12
Medicare end stage renal disease program enrollment per million population for patients with functioning grafts, by age, sex, race, and primary diagnosis: 1986-91

Age, sex, race, and primary diagnosis	1986	1987	1988	1989	1990	1991	Average annual percent change	Percent change 1990-91
Number of patients per million								
Total	93	107	118	130	144	160	11.5	11.0
Age								
Under 15 years	13	14	15	16	17	19	7.7	10.4
15-24 years	54	59	60	62	67	73	6.2	10.0
25-34 years	142	151	155	161	171	182	5.1	6.5
35-44 years	191	215	233	250	273	292	8.8	6.8
45-54 years	183	222	255	281	311	347	13.6	11.5
55-64 years	119	151	183	214	249	290	19.5	16.5
65-74 years	27	40	55	71	93	118	34.7	26.7
75 years or over	2	3	3	5	6	8	38.8	29.0
Sex								
Male	121	138	151	165	182	201	10.7	10.1
Female	67	78	87	97	108	121	12.8	12.3
Race								
Asian	61	74	84	94	108	120	14.5	10.6
Black	144	162	181	196	216	238	10.7	10.6
White	89	103	114	126	140	155	11.7	11.2
American Indian	112	131	150	170	191	214	13.7	11.9
Other/unknown	—	—	—	—	—	—	—	—
Primary diagnosis								
Diabetes	16	19	21	24	28	32	15.0	13.5
Glomerulonephritis	25	29	32	35	39	43	11.1	10.6
Hypertension	10	12	14	16	18	20	13.7	10.9
Polycystic kidney disease	6	7	8	9	11	12	16.4	11.6
Interstitial nephritis	4	5	5	6	6	7	12.1	13.1
Obstructive nephropathy	3	3	3	3	4	4	7.3	10.6
Other	6	7	8	9	10	11	14.2	12.7
Unknown	9	10	10	10	11	12	6.2	9.9
Not reported	15	15	16	18	19	20	6.4	6.6

NOTE: All calculations are based on unrounded numbers. Average annual percent increase calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1993 update, 1986-91.

Patient treatment trends

Treatment trends

The statistics in this section are taken from the annual ESRD Facility Survey, Form HCFA-2744. The exception is Table 18, which is based on counts of transplant records (HCFA-2745-U4) linked with beneficiary entitlement data in the ESRD PMMIS. The facility survey covers all patients receiving services at Medicare-approved dialysis facilities and transplant centers. All figures shown are as of December 31 for each year except for those tables displaying kidney transplants and dialysis treatment activities. Those tables reflect activities that occurred during the calendar year. Because they include both Medicare entitled and non-Medicare patients, these numbers are not comparable to those for the Medicare ESRD population presented in other sections of this report. Also, because only Medicare-approved facilities are surveyed, the numbers do not represent the entire U.S. ESRD population. However, approximately 98 percent of the total U.S. ESRD population are represented in these data. These caveats must be kept in mind when using Tables 13-17 and 19.

Dialysis patients

Counts of dialysis patients by Medicare and non-Medicare categories for years 1980 through 1992 are shown in Table 13. The total number of dialysis patients increased by 10.4 percent during 1992, from 142,488 to 157,354. The number of Medicare covered dialysis patients increased by 9.9 percent, while the number of non-Medicare patients increased by 16.8 percent. From 1980 to 1992, the rate of growth of non-Medicare dialysis patients was slightly greater than for Medicare dialysis patients (10.3 percent and 9.5 percent, respectively). As a result, non-Medicare patients accounted for 7.6 percent of all dialysis patients in 1992, up slightly from 7.1 percent in 1980.

The dialysis population continues to increase at a rapid pace. The rate of increase from 1989 through 1992 of 10.6 percent was greater than the rate of increase from 1980 through 1989 (9.3 percent).

Data on the ESRD dialysis population, by type and place of dialysis for the years 1987 through 1992, are shown in Table 14. During these years, the total number of dialysis patients, for the facilities reporting, increased from 98,432 in 1987 to 157,354 in 1992, or an average annual growth rate of 9.8 percent.

By far the most common dialysis modality is outpatient hemodialysis. The number of patients receiving dialysis in this modality increased from 79,352 in 1987 (80.6 percent of all dialysis patients) to 128,458 in 1992 (81.6 percent of all dialysis patients). Further, in 1992, the hemodialysis modality accounted for 99.8 percent of patients dialyzing in the outpatient setting. The remaining 0.2 percent of those dialyzing as outpatients were using peritoneal dialysis. Overall, the outpatient population grew at a 10.0 percent annual rate.

There were 28,152 patients dialyzing at home in 1992, which was 17.9 percent of all dialysis patients. As a percent of all dialysis patients, this represents a net decrease from 1987 when there were 18,283 home patients, representing 18.6 percent of all dialysis patients. Within the home dialysis population, CAPD was consistently the most frequently selected modality for dialysis. There were 20,872 patients in this group in 1992, compared to 7,280 for all other at-home modalities. However, CCPD was the fastest growing treatment, compared to both in-unit and other home patient categories. The average annual rate of increase for CCPD from 1987 to 1992 was 23.5 percent, with an increase from 1991 to 1992 of 29.4 percent. CAPD grew at a slightly higher rate (10.2 percent per year) than the total dialysis population (9.8 percent); however, the use of home hemodialysis decreased during this period by an average of -9.6 percent per year. Overall, the home patient population grew at a 9.0 percent annual rate.

The number of persons completing self-dialysis training is shown in Table 15. The number of patients completing home dialysis training experienced an average annual percent increase of 10.0 percent. The data in Table 15 support the finding in Table 14 that CCPD was the fastest growing treatment. The average annual rate of increase for CCPD was 22.0 percent. The percent change from 1991 to 1992 was 26.6 percent.

Transplant patients

Counts of kidney transplant patients, by Medicare and non-Medicare categories, are shown in Table 16. During the years 1980 through 1986, the number of persons receiving a kidney transplant increased from 4,676 to 8,948, an average increase of 11.4 percent per year. However, from 1986 to 1989, there was no growth in kidney transplants, but a slight drop to 8,885. In 1990, there was a 10.1 percent increase in the number of transplant patients. The average annual rate of increase in the number of transplanted patients from 1980 through 1992 was 6.6 percent, and the average annual rate of increase was about the same for Medicare covered transplants (6.5 percent). The average annual rate of increase for non-Medicare covered transplants was 7.8 percent. In 1992, 90.0 percent of all kidney transplants were covered by Medicare, down slightly from 91.2 percent in 1980.

Counts of kidney transplants by donor type are shown in Table 17. The overall trends are very similar to those in Table 16. The number of kidney transplants is slightly higher than the number of transplanted patients because a few patients receive more than one transplant during a calendar year. Cadaver donor transplants increased at a faster rate than did living-related donor transplants during the 1980 through 1990 period (8.4 percent and 4.6 percent annual rates of increase, respectively). In 1980, cadaver donor transplants accounted for 72.9 percent of all reported kidney transplants. By 1992, this had risen to 74.9 percent. In 1992, there was a slight decrease

Table 13
Dialysis patients, by Medicare coverage: 1980-1992¹

Year	Total		Medicare coverage			
			Medicare		Non-Medicare	
	Number	Percent change	Number	Percent change	Number	Percent change
1980	52,364	—	48,665	—	3,699	—
1981	52,924	12.5	55,127	13.3	3,797	2.7
1982	65,765	11.6	61,782	12.1	3,983	4.9
1983	71,987	9.5	67,569	9.4	4,419	10.9
1984	78,483	9.0	73,485	8.8	4,998	13.1
1985	84,797	8.0	79,134	7.7	5,663	13.3
1986	90,886	7.2	84,815	7.2	6,071	7.2
1987	98,432	8.3	91,361	7.7	7,071	16.5
1988	105,958	7.7	98,191	7.5	7,767	9.8
1989	116,169	9.6	107,447	9.4	8,722	12.3
1990	129,800	11.7	120,218	11.9	9,582	9.9
1991	142,488	9.8	132,251	10.0	10,237	6.8
1992	157,354	10.4	145,399	9.9	11,955	16.8
Average annual percent change						
1980-1992	—	9.6	—	9.5	—	10.3

¹Counts are as of December 31 of each year from the End Stage Renal Disease Facility Surveys.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility survey, 1980-92.

Table 14
End stage renal disease dialysis population, by type and place of dialysis: 1987-92¹

Type and place of dialysis	1987	1988	1989	1990	1991	1992	Average annual percent change	Percent change 1991-92
Number of patients								
Total	98,432	105,958	116,169	129,800	142,488	157,354	9.8	10.4
Outpatient hemodialysis	79,352	86,250	95,371	106,432	116,819	128,458	10.1	10.0
Outpatient peritoneal	440	365	319	273	234	193	-15.2	-17.5
Home hemodialysis	3,582	3,197	2,914	2,483	2,266	2,161	-9.6	-4.6
Home peritoneal	168	326	166	190	173	205	4.1	18.5
CAPD ²	12,825	13,318	14,830	16,969	18,881	20,872	10.2	10.5
CCPD ³	1,708	1,922	2,311	2,998	3,797	4,914	23.5	29.4
Self training	357	580	258	455	442	551	9.1	24.7

¹Counts are as of December 31 of each year from the End Stage Renal Disease Facility Surveys.

²Continuous ambulatory peritoneal dialysis.

³Continuous cycling peritoneal dialysis.

NOTE: Average annual percent change calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1987-92.

Table 15
Dialysis patients completing training, by type of dialysis: 1987-92

Type of dialysis	1987	1988	1989	1990	1991	1992	Average annual change	Percent change 1991-92
Number of patients								
Total completed dialysis training ¹	9,477	10,445	11,032	13,096	15,252	16,618	10.0	9.0
Hemodialysis	823	983	800	976	681	854	0.7	25.4
Peritoneal	212	191	138	166	138	99	14.1	-28.3
CAPD ²	7,184	7,882	8,529	9,843	11,753	12,271	11.3	4.4
CCPD ³	1,258	1,389	1,565	2,111	2,680	3,394	22.0	26.6

¹ Includes a small percentage of hemodialysis and peritoneal dialysis patients who completed training during the year for self-care outpatient dialysis.

² Continuous ambulatory peritoneal dialysis.

³ Continuous cycling peritoneal dialysis.

NOTE: Average annual percent change calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1987-92.

(0.9 percent) in the number of cadaver transplants and a slight increase (4.1 percent) of living related donor transplants. Beginning in 1988, living donor transplants were reported as living-related and living-unrelated. Thus, about 3 percent (56 transplants) of the 7.7 percent decrease in living-related donor transplants between 1987 and 1988 is a reporting artifact. There were 2,391 living-related donor transplants in 1992, representing 23.6 percent of all reported kidney transplants, and there were 145 living-unrelated donor transplants, representing the remaining 1.4 percent of all reported kidney transplants.

Trends in kidney transplantation by age, sex, race, and diagnostic category are shown in Table 18. As stated above, figures in Tables 16 and 18 will not be exactly comparable because the data are compiled from two different sources with different lead times for data input. However, the trends of the data in these tables are comparable. In 1986, there were 8,501 Medicare entitled persons who received a kidney transplant. By 1991, the number was 9,292, an average annual rate of increase of 1.8 percent. However, almost all of the increase occurred between 1990 and 1991. From 1987 to 1989 there were slight declines in the number of Medicare patients receiving a transplant.

There has been a gradual increase in the age of transplant recipients. The average age of transplant recipients increased from 37.9 years of age in 1986 to 40.5 years of age in 1991. There was a net decline in the number of transplant recipients under 35 years of age from 3,664 in 1986 to 3,311 in 1991. All of the age groups over 35 years of age experienced an increase in the number of transplant recipients. The largest percentage increase occurred among the elderly. Persons 65 years of age and over accounted for 1.4 percent of all transplant recipients in 1986 and 3.6 percent in 1991.

Transplants have increased more rapidly among

females than among males (3.0 percent versus 1.0 percent average annual rate of increase, respectively). Females accounted for 37.5 percent of Medicare transplant recipients in 1986 and 39.9 percent in 1991.

Asians and American Indians had the highest average annual rates of growth in numbers of transplant recipients (7.4 percent and 7.1 percent, respectively). However, due to the small number of Medicare ESRD beneficiaries in these two groups, they still accounted for only 3.7 percent of all transplant recipients. Increases in the number of transplant recipients were relatively similar for black (2.3 percent per year) and white beneficiaries (1.3 percent per year). In 1991, 20.6 percent of Medicare kidney transplant recipients were black and 75.0 percent were white.

The number of Medicare transplant recipients increased most rapidly for persons whose renal failure was attributed to diabetes (4.3 percent per year), hypertension (4.1 percent per year), and polycystic kidney disease (2.6 percent per year). In 1991, persons whose renal failure was attributed to glomerulonephritis, diabetes, and hypertension accounted for 25.7, 22.5, and 14.0 percent of all transplant recipients respectively.

From 1983 to 1992, the number of persons awaiting kidney transplants increased from 7,176 to 21,618, an average annual rate of increase of 13.0 percent (Table 19). In 1983, 10.0 percent of all dialysis patients were awaiting a transplant. From 1986 to 1989, the percent of total patients awaiting a kidney transplant remained relatively constant at 12.2 to 12.6 percent. However, large percentage increases in the waiting list in both 1990 and 1992 put the percent waiting to over 13 percent in each of these years.

Table 16
Kidney transplant patients, by Medicare coverage: 1980-92

Year	Medicare coverage					
	Total		Medicare		Non-Medicare	
	Number	Percent change	Number	Percent change	Number	Percent change
1980	4,676	—	4,266	—	410	—
1981	4,898	4.7	4,440	4.1	458	11.7
1982	5,252	7.2	4,846	9.1	406	-11.4
1983	6,098	16.1	5,591	15.4	507	24.9
1984	6,933	13.7	6,304	12.8	629	24.1
1985	7,676	10.7	7,073	12.2	603	-4.1
1986	8,948	16.6	8,258	16.8	690	14.4
1987	8,949	0.0	8,298	0.5	651	-5.7
1988	8,909	-0.4	8,175	-1.5	734	12.7
1989	8,885	-0.3	8,111	-0.8	774	5.4
1990	9,779	10.1	8,973	10.6	806	4.1
1991	10,011	2.4	9,197	2.5	814	1.0
1992	10,101	0.9	9,093	1.1	1,008	23.8
Average annual percent change						
1980-92	—	6.6	—	6.5	—	7.8

NOTE: Average annual percent change calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1980-92.

Table 17
Kidney transplants, by donor type: 1980-92

Year	Donor type							
	Total		Cadaver		Living-related		Living-unrelated ¹	
	Number	Percent change	Number	Percent change	Number	Percent change	Number	Percent change
1980	4,704	—	3,427	—	1,277	—	—	—
1981	4,905	4.3	3,445	0.5	1,460	14.3	—	—
1982	5,358	9.2	3,681	6.9	1,677	14.9	—	—
1983	6,112	14.1	4,328	17.6	1,784	6.4	—	—
1984	6,968	14.0	5,264	21.6	1,704	-4.5	—	—
1985	7,695	10.4	5,819	10.5	1,876	10.1	—	—
1986	8,976	16.6	7,089	21.8	1,887	0.6	—	—
1987	8,967	-0.1	7,060	-0.4	1,907	1.1	—	—
1988	8,932	-0.4	7,116	0.8	1,760	-7.7	56	—
1989	8,899	-0.4	7,006	-1.5	1,823	3.6	70	25.0
1990	9,796	10.1	7,705	10.0	2,001	9.8	90	28.6
1991	10,026	2.3	7,644	-0.8	2,296	14.7	86	-4.4
1992	10,115	0.9	7,579	-0.9	2,391	4.1	145	68.6
Average annual percent change								
1980-92	—	6.6	—	6.8	—	5.4	—	26.9

¹The living-unrelated category was added to the End Stage Renal Disease Facility Survey in 1988.

NOTE: Average annual percent change calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1980-92.

Table 18
Medicare end stage renal disease program transplants,
by age, sex, race, and primary diagnosis: 1986-91

Age, sex, race, and primary diagnosis	1986	1987	1988	1989	1990	1991	Percent 1990	Average annual percent increase	Percent increase 1990-91
Total	8,501	8,389	8,267	8,231	9,033	9,292	100.0	1.8	2.9
Age									
Under 15 years	383	414	360	344	325	378	4.1	-0.3	16.3
15-24 years	1,063	944	884	850	903	866	9.3	-4.0	-4.1
25-34 years	2,218	1,951	1,900	1,942	2,071	2,067	22.2	-1.4	-0.2
35-44 years	2,178	2,241	2,190	2,210	2,405	2,473	26.6	2.6	2.8
45-54 years	1,669	1,681	1,683	1,642	1,851	1,905	20.5	2.7	2.9
55-64 years	870	981	1,036	1,040	1,186	1,270	13.7	7.9	7.1
65-74 years	117	173	208	196	279	328	3.5	22.9	17.6
75 years or over	3	4	6	7	13	5	0.1	10.8	-61.5
Sex									
Male	5,309	5,184	5,039	4,997	5,443	5,584	60.1	1.0	2.6
Female	3,192	3,205	3,228	3,234	3,590	3,708	39.9	3.0	3.3
Race									
Asian	165	190	171	186	230	236	2.5	7.4	2.6
Black	1,708	1,679	1,709	1,671	1,854	1,911	20.6	2.3	3.1
White	6,520	6,405	6,230	6,221	6,800	6,967	75.0	1.3	2.5
American Indian	76	84	94	98	92	107	1.2	7.1	16.3
Other/unknown	32	31	63	55	57	71	0.8	17.3	24.6
Primary diagnosis									
Diabetes	1,695	1,639	1,631	1,722	1,905	2,088	22.5	4.3	9.6
Glomerulonephritis	2,300	2,321	2,242	2,163	2,409	2,386	25.7	0.7	-1.0
Hypertension	1,067	1,104	1,142	1,079	1,278	1,305	14.0	4.1	2.1
Polycystic kidney disease	604	660	645	592	701	688	7.4	2.6	-1.9
Interstitial nephritis	404	382	326	349	364	407	4.4	0.1	11.8
Obstructive nephropathy	225	203	151	168	183	193	2.1	-3.0	5.5
Other	687	655	655	688	739	746	8.0	1.7	0.9
Unknown	706	680	624	620	651	665	7.2	-1.2	2.2
Not reported	813	745	851	850	803	814	8.8	0.0	1.4

NOTE: All calculations are based on unrounded numbers. Average annual percent increase calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1993 update, 1986-91.

Table 19
Patients awaiting transplants: 1983-92

Year	Number of patients	Percent increase	Percent of dialysis population
1983	7,176	—	10.0
1984	8,562	19.3	10.9
1985	9,791	14.4	11.5
1986	11,108	13.5	12.2
1987	12,140	9.3	12.3
1988	13,282	9.4	12.5
1989	14,687	10.6	12.6
1990	17,556	19.5	13.5
1991	18,234	3.9	12.8
1992	21,618	18.6	13.7
Average annual percent increase			
1983-92	-	13.0	-

NOTE: Average annual percent increase calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1983-92.

End stage renal disease facility data and patient counts

The information presented in Tables 20 through 35 was collected through the use of the ESRD Facility Survey, Form HCFA-2744, and covers the period of January 1, 1992 through December 31, 1992. The rate of compliance of surveyed facilities in completing the ESRD Facility Survey was 100 percent for 1992. It is important to note that the number of facilities surveyed and reporting, as summarized in Tables 20 through 33, does not equal the total number of Medicare-approved providers of renal care as reported in Tables 55, 56, and 57. Some Medicare-approved hospitals were not surveyed because they provide acute dialysis only or they serve as a backup to a chronic dialysis facility, i.e., they do not provide routine maintenance dialysis for ESRD patients. Other Medicare-approved renal providers were not requested to complete an ESRD Facility Survey because they were so recently certified that there was insufficient time to include them in the survey population.

It must also be noted that this section includes only Medicare-approved renal providers and, thus, this section does not reflect all renal dialysis facilities in the country. There are a number of facilities providing chronic dialysis services (such as several Department of Veterans Affairs and Department of Defense facilities), that are not Medicare-approved and are not included in Tables 20 to 35. A brief summary of the number of patients receiving dialysis services from Department of Veterans Affairs facilities is provided in Table 36. Therefore, due to slight differences in reporting facilities and some imprecision in determining Medicare dialysis status, the survey data will not agree with the PMMIS enrollment data shown in Tables 8 through 12.

The survey tables (Tables 20 through 34) are arrayed either nationally or by State. Tables 23 through 26 and Tables 34 and 35 provide aggregate dialysis patient population figures as of December 31, 1992 (end of the survey period). The other tables reflect activity for the entire survey period, unless otherwise noted. Tables 21, 22, 29, and 31 display patients by Medicare status: Currently enrolled in Medicare, Medicare application pending, and non-Medicare. Patients appearing in the non-Medicare category may include those who are covered by the Department of Veterans Affairs, those who are covered by private insurance, those who are covered by Medicaid, and foreign nationals. Tables 34 and 35 display the dialysis patient population by type of facilities; independent and hospital, respectively, as well as profit and nonprofit facilities.

In the 1992 facility survey, we found that, as of December 31, 1992, 86.4 percent of all ESRD patients were entitled to Medicare benefits; 6.0 percent had applications for Medicare entitlement pending; and 7.6 percent were not eligible for Medicare. (See Tables 21 and 29.) Of the 157,354 dialysis patients reported from the facility survey, 90,558 (57.6 percent) were dialyzing at independent, for-profit dialysis facilities. (See Table 34.) From 1982 through 1992, the number of patients dialyzing at independent facilities experienced an average annual percent change of 11.8 percent for outpatients and 15.6 percent for home patients, compared to 4.4 percent for outpatients and 4.1 percent for home patients dialyzing under the care of hospital facilities. (See Table 35.) We estimate that approximately 300 home hemodialysis patients are not included in the facility survey counts. This is due to idiosyncratic reporting of several health care delivery entities.

Table 20
End stage renal disease facilities surveyed, by State: 1992

State	Dialysis facilities surveyed	Transplant centers surveyed
Total	2,236	229
Alabama	46	2
Alaska	2	0
Arizona	45	5
Arkansas	36	3
California	235	24
Colorado	19	4
Connecticut	20	2
Delaware	6	0
District of Columbia	21	5
Florida	157	7
Georgia	86	4
Hawaii	12	1
Idaho	7	0
Illinois	96	8
Indiana	41	2
Iowa	16	3
Kansas	18	2
Kentucky	31	3
Louisiana	71	7
Maine	6	1
Maryland	57	3
Massachusetts	45	10
Michigan	58	10
Minnesota	34	4
Mississippi	39	1
Missouri	52	9
Montana	7	0
Nebraska	12	3
Nevada	6	2
New Hampshire	6	1
New Jersey	41	3
New Mexico	17	2
New York	124	15
North Carolina	65	5
North Dakota	10	3
Ohio	57	12
Oklahoma	41	6
Oregon	18	1
Pennsylvania	105	11
Puerto Rico	23	1
Rhode Island	8	0
South Carolina	47	1
South Dakota	7	0
Tennessee	61	8
Texas	151	17
Utah	15	2
Vermont	2	1
Virgin Islands	1	0
Virginia	76	5
Washington	22	5
West Virginia	14	2
Wisconsin	39	3
Wyoming	2	0
American Samoa	1	0
Guam	1	0
Mariana Islands	1	0

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1992.

Table 21
Dialysis patient eligibility status, by State: 1992

State	Facilities reporting	Total dialysis patients	Eligibility status		
			Currently enrolled in Medicare	Medicare application pending	Non-Medicare
Total	2,222	157,354	135,883	9,516	11,955
Alabama	46	3,275	2,942	153	180
Alaska	2	90	78	9	3
Arizona	45	2,559	2,098	133	328
Arkansas	36	1,237	1,114	76	47
California	235	17,904	14,522	1,043	2,339
Colorado	18	1,387	1,196	95	96
Connecticut	20	1,924	1,722	55	147
Delaware	6	538	473	24	41
District of Columbia	21	1,372	1,030	90	252
Florida	156	8,737	7,695	714	328
Georgia	85	5,314	4,750	166	398
Hawaii	12	894	777	77	40
Idaho	7	264	249	11	4
Illinois	96	7,099	5,822	419	858
Indiana	41	3,275	2,970	160	145
Iowa	16	1,143	1,029	91	23
Kansas	18	1,106	1,001	60	45
Kentucky	31	1,797	1,581	100	116
Louisiana	71	3,772	3,339	258	175
Maine	6	346	289	23	34
Maryland	57	3,445	2,874	314	257
Massachusetts	45	3,060	2,556	164	340
Michigan	57	5,405	4,672	474	259
Minnesota	34	1,852	1,610	183	59
Mississippi	39	2,286	2,079	100	107
Missouri	51	3,104	2,675	337	92
Montana	7	329	297	18	14
Nebraska	12	715	588	115	12
Nevada	6	560	490	46	24
New Hampshire	6	377	341	24	12
New Jersey	40	5,511	4,800	287	424
New Mexico	17	1,012	831	51	130
New York	120	12,655	10,412	819	1,424
North Carolina	64	5,173	4,698	126	349
North Dakota	10	318	277	22	19
Ohio	57	5,850	4,995	505	350
Oklahoma	41	1,490	1,322	128	40
Oregon	18	1,253	1,145	85	23
Pennsylvania	105	7,901	6,833	510	558
Puerto Rico	23	2,174	1,945	70	159
Rhode Island	8	608	570	23	15
South Carolina	47	2,880	2,619	68	193
South Dakota	7	222	187	32	3
Tennessee	59	3,427	3,097	140	190
Texas	151	11,608	10,286	445	877
Utah	15	465	415	36	14
Vermont	2	127	122	2	3
Virgin Islands	1	38	27	5	6
Virginia	76	4,367	3,903	249	215
Washington	22	2,052	1,804	181	67
West Virginia	14	838	763	40	35
Wisconsin	38	2,016	1,816	141	59
Wyoming	2	47	46	0	1
American Samoa	1	31	28	1	2
Guam	1	99	66	11	22
Mariana Islands	1	26	17	7	2

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1992.

Table 22
Dialysis patient counts national summary, by place of dialysis: 1992

Patient count	Total	Percent	Place of dialysis			
			Outpatient	Percent	Home	Percent
Dialysis patients beginning survey	142,780	—	117,491	82.3	25,289	17.7
Additions	91,011	—	77,052	84.7	13,959	15.3
New starts	58,806	64.6	49,604	64.4	9,202	65.9
Restarted	895	1.0	789	1.0	106	0.8
Transferred in	28,698	31.5	24,511	31.8	4,187	30.0
Returned after transplant	2,612	2.9	2,148	2.8	464	3.3
Losses	76,437	—	64,203	84.0	12,234	16.0
Deaths	35,400	46.3	29,859	46.5	5,541	45.3
Recovered functions	2,035	2.7	1,774	2.8	261	2.1
Transplanted	8,728	11.4	6,286	9.8	2,442	20.0
Transferred out	28,534	37.3	24,732	38.5	3,802	31.1
Discontinued dialysis	1,441	1.9	1,293	2.0	148	1.2
Lost to followup	299	0.4	259	0.4	40	0.3
Number needed to balance ¹	0	—	-1,138	—	1,138	—
Dialysis patients end of survey	157,354	—	129,202	82.1	28,152	17.9
Hemodialysis	130,845	83.2	128,684	99.6	2,161	7.7
IPD ²	400	0.3	195	0.2	205	0.7
CAPD ³	21,138	13.4	266	0.2	20,872	74.1
CCPD ⁴	4,971	3.2	57	0.0	4,914	17.5
Medicare status	157,354	—	—	—	—	—
Medicare	135,883	86.4	—	—	—	—
Medicare pending	9,516	6.0	—	—	—	—
Non-Medicare	11,955	7.6	—	—	—	—

¹Accurate counts are not always available because of the movement of home patients, self-care training, and in-unit backup dialysis.

²Intermittent peritoneal dialysis.

³Continuous ambulatory peritoneal dialysis.

⁴Continuous cycling peritoneal dialysis.

NOTE: Percents may not add to total because of rounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1992.

Table 23
Patients receiving care in the outpatient setting, by State: December 31, 1992

State	Facilities reporting	Total outpatients	Outpatient dialysis		Self-dialysis training			
			Hemo ¹	IPD ²	Hemo ¹	IPD ²	CAPD ³	CCPD ⁴
Total	2,222	129,202	128,458	193	226	2	266	57
Alabama	46	2,773	2,768	0	1	0	3	1
Alaska	2	69	69	0	0	0	0	0
Arizona	45	2,110	2,083	1	21	0	5	0
Arkansas	36	982	978	3	0	0	1	0
California	235	15,465	15,437	1	4	0	21	2
Colorado	18	1,070	1,066	0	2	0	1	1
Connecticut	20	1,321	1,306	0	0	0	15	0
Delaware	6	434	434	0	0	0	0	0
District of Columbia	21	1,214	1,213	0	1	0	0	0
Florida	156	7,600	7,575	6	0	0	15	4
Georgia	85	4,576	4,560	2	14	0	0	0
Hawaii	12	827	824	0	1	0	2	0
Idaho	7	189	189	0	0	0	0	0
Illinois	96	5,948	5,909	7	3	0	26	3
Indiana	41	2,366	2,358	0	3	0	5	0

See footnotes at end of table.

Table 23—Continued
Patients receiving care in the outpatient setting, by State: December 31, 1992

State	Facilities reporting	Total outpatients	Outpatient dialysis		Self-dialysis training			
			Hemo ¹	IPD ²	Hemo ¹	IPD ²	CAPD ³	CCPD ⁴
Iowa	16	830	823	1	2	0	4	0
Kansas	18	816	812	0	0	0	3	1
Kentucky	31	1,385	1,377	3	0	0	4	1
Louisiana	71	3,283	3,278	0	1	0	3	1
Maine	6	267	267	0	0	0	0	0
Maryland	57	2,940	2,933	3	2	0	2	0
Massachusetts	45	2,547	2,545	0	1	0	1	0
Michigan	57	3,969	3,937	15	2	0	15	0
Minnesota	34	1,558	1,554	0	0	0	3	1
Mississippi	39	1,976	1,972	2	0	0	2	0
Missouri	51	2,352	2,327	3	2	2	17	1
Montana	7	238	236	0	0	0	2	0
Nebraska	12	414	411	0	0	0	3	0
Nevada	6	414	411	0	2	0	0	1
New Hampshire	6	270	270	0	0	0	0	0
New Jersey	40	4,306	4,251	36	5	0	12	2
New Mexico	17	788	785	0	0	0	3	0
New York	120	10,306	10,110	70	59	0	49	18
North Carolina	64	3,983	3,954	0	23	0	3	3
North Dakota	10	265	265	0	0	0	0	0
Ohio	57	4,712	4,701	3	0	0	7	1
Oklahoma	41	1,174	1,171	0	0	0	3	0
Oregon	18	837	834	0	1	0	2	0
Pennsylvania	105	6,643	6,626	4	9	0	2	2
Puerto Rico	23	1,889	1,873	12	0	0	2	2
Rhode Island	8	533	533	0	0	0	0	0
South Carolina	47	2,521	2,472	0	47	0	2	0
South Dakota	7	200	200	0	0	0	0	0
Tennessee	59	2,787	2,779	1	6	0	1	0
Texas	151	10,091	10,052	17	5	0	11	6
Utah	15	377	377	0	0	0	0	0
Vermont	2	90	90	0	0	0	0	0
Virgin Islands	1	38	38	0	0	0	0	0
Virginia	76	3,612	3,602	0	0	0	6	4
Washington	22	1,498	1,482	1	8	0	6	1
West Virginia	14	640	637	2	0	0	0	1
Wisconsin	38	1,518	1,513	0	1	0	4	0
Wyoming	2	35	35	0	0	0	0	0
American Samoa	1	31	31	0	0	0	0	0
Guam	1	99	99	0	0	0	0	0
Mariana Islands	1	26	26	0	0	0	0	0

¹Hemodialysis.

²Intermittent peritoneal dialysis.

³Continuous ambulatory peritoneal dialysis.

⁴Continuous cycling peritoneal dialysis.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1992.

Table 24
Patients receiving care at home, by State: December 31, 1992

State	Facilities reporting	Total home patients	Hemodialysis	IPD ¹	CAPD ²	CCPD ³
Total	2,222	28,152	2,161	205	20,872	4,914
Alabama	46	502	29	0	348	125
Alaska	2	21	2	0	17	2
Arizona	45	449	28	0	284	137
Arkansas	36	255	11	0	207	37
California	235	2,439	52	5	1,859	523
Colorado	18	317	43	4	193	77
Connecticut	20	603	6	1	468	128
Delaware	6	104	1	0	99	4
District of Columbia	21	158	2	0	127	29
Florida	156	1,137	56	1	795	285
Georgia	85	738	34	10	569	125
Hawaii	12	67	6	0	53	8
Idaho	7	75	2	0	48	25
Illinois	96	1,151	87	0	838	226
Indiana	41	909	48	0	813	48
Iowa	16	313	72	0	203	38
Kansas	18	290	23	0	244	23
Kentucky	31	412	14	13	318	67
Louisiana	71	489	16	0	363	110
Maine	6	79	7	0	52	20
Maryland	57	505	13	0	442	50
Massachusetts	45	513	59	0	344	110
Michigan	57	1,436	87	3	1,247	99
Minnesota	34	294	101	0	168	25
Mississippi	39	310	120	0	169	21
Missouri	51	752	46	18	553	135
Montana	7	91	19	0	67	5
Nebraska	12	301	8	0	257	36
Nevada	6	146	20	0	86	40
New Hampshire	6	107	3	0	73	31
New Jersey	40	1,205	112	0	803	290
New Mexico	17	224	2	0	201	21
New York	120	2,349	211	14	1,780	344
North Carolina	64	1,190	47	24	821	298
North Dakota	10	53	1	0	43	9
Ohio	57	1,138	27	9	888	214
Oklahoma	41	316	21	13	264	18
Oregon	18	416	44	4	297	71
Pennsylvania	105	1,258	66	2	942	248
Puerto Rico	23	285	28	3	246	8
Rhode Island	8	75	1	0	64	10
South Carolina	47	359	20	2	270	67
South Dakota	7	22	0	0	13	9
Tennessee	59	640	84	50	443	63
Texas	151	1,517	67	6	1,018	426
Utah	15	88	16	0	66	6
Vermont	2	37	13	0	23	1
Virgin Islands	1	0	0	0	0	0
Virginia	76	755	78	2	595	80
Washington	22	554	271	20	216	47
West Virginia	14	198	9	0	157	32
Wisconsin	38	498	28	1	407	62
Wyoming	2	12	0	0	11	1
American Samoa	1	0	0	0	0	0
Guam	1	0	0	0	0	0
Mariana Islands	1	0	0	0	0	0

¹Intermittent peritoneal dialysis.

²Continuous ambulatory peritoneal dialysis.

³Continuous cycling peritoneal dialysis.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1992.

Table 25
Dialysis treatment setting of end stage renal disease patients, by State: 1992

State	Facilities reporting	Total dialysis patients	Dialyzed outpatient		Dialyzed at home	
			Total	Percent	Total	Percent
Total	2,222	157,354	129,202	82.1	28,152	17.9
Alabama	46	3,275	2,773	84.7	502	15.3
Alaska	2	90	69	76.7	21	23.3
Arizona	45	2,559	2,110	82.5	449	17.5
Arkansas	36	1,237	982	79.4	255	20.6
California	235	17,904	15,465	86.4	2,439	13.6
Colorado	18	1,387	1,070	77.1	317	22.9
Connecticut	20	1,924	1,321	68.7	603	31.3
Delaware	6	538	434	80.7	104	19.3
District of Columbia	21	1,372	1,214	88.5	158	11.5
Florida	156	8,737	7,600	87.0	1,137	13.0
Georgia	85	5,314	4,576	86.1	738	13.9
Hawaii	12	894	827	92.5	67	7.5
Idaho	7	264	189	71.6	75	28.4
Illinois	96	7,099	5,948	83.8	1,151	16.2
Indiana	41	3,275	2,366	72.2	909	27.8
Iowa	16	1,143	830	72.6	313	27.4
Kansas	18	1,106	816	73.8	290	26.2
Kentucky	31	1,797	1,385	77.1	412	22.9
Louisiana	71	3,772	3,283	87.0	489	13.0
Maine	6	346	267	77.2	79	22.8
Maryland	57	3,445	2,940	85.3	505	14.7
Massachusetts	45	3,060	2,547	83.2	513	16.8
Michigan	57	5,405	3,969	73.4	1,436	26.6
Minnesota	34	1,852	1,558	84.1	294	15.9
Mississippi	39	2,286	1,976	86.4	310	13.6
Missouri	51	3,104	2,352	75.8	752	24.2
Montana	7	329	238	72.3	91	27.7
Nebraska	12	715	414	57.9	301	42.1
Nevada	6	560	414	73.9	146	26.1
New Hampshire	6	377	270	71.6	107	28.4
New Jersey	40	5,511	4,306	78.1	1,205	21.9
New Mexico	17	1,012	788	77.9	224	22.1
New York	120	12,655	10,306	81.4	2,349	18.6
North Carolina	64	5,173	3,983	77.0	1,190	23.0
North Dakota	10	318	265	83.3	53	16.7
Ohio	57	5,850	4,712	80.5	1,138	19.5
Oklahoma	41	1,490	1,174	78.8	316	21.2
Oregon	18	1,253	837	66.8	416	33.2
Pennsylvania	105	7,901	6,643	84.1	1,258	15.9
Puerto Rico	23	2,174	1,889	86.9	285	13.1
Rhode Island	8	608	533	87.7	75	12.3
South Carolina	47	2,880	2,521	87.5	359	12.5
South Dakota	7	222	200	90.1	22	9.9
Tennessee	59	3,427	2,787	81.3	640	18.7
Texas	151	11,608	10,091	86.9	1,517	13.1
Utah	15	465	377	81.1	88	18.9
Vermont	2	127	90	70.9	37	29.1
Virgin Islands	1	38	38	100.0	0	0.0
Virginia	76	4,367	3,612	82.7	755	17.3
Washington	22	2,052	1,498	73.0	554	27.0
West Virginia	14	838	640	76.4	198	23.6
Wisconsin	38	2,016	1,518	75.3	498	24.7
Wyoming	2	47	35	74.5	12	25.5
American Samoa	1	31	31	100.0	0	0.0
Guam	1	99	99	100.0	0	0.0
Mariana Islands	1	26	26	100.0	0	0.0

NOTE: Percents may not add to total because of rounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1992

Table 26
Patients completing a self-dialysis training course during the calendar year, by State: 1992

State	Facilities reporting	Total patients	Hemo-dialysis	IPD ¹	CAPD ²	CCPD ³
Total	1,071	16,618	854	99	12,271	3,394
Alabama	23	371	8	0	268	95
Alaska	1	21	1	0	18	2
Arizona	20	272	27	0	186	59
Arkansas	15	175	1	1	145	28
California	112	1,372	10	0	1,052	310
Colorado	10	176	20	3	105	48
Connecticut	16	364	2	0	299	63
Delaware	2	51	0	0	49	2
District of Columbia	7	96	5	0	77	14
Florida	75	723	1	0	516	206
Georgia	39	476	4	2	363	107
Hawaii	2	39	11	0	28	0
Idaho	2	42	0	0	29	13
Illinois	45	599	6	1	458	134
Indiana	24	464	10	0	425	29
Iowa	12	172	28	0	121	23
Kansas	7	163	4	0	140	19
Kentucky	16	242	3	8	181	50
Louisiana	19	307	1	0	216	90
Maine	4	118	0	0	74	44
Maryland	29	273	11	0	226	36
Massachusetts	25	285	1	0	201	83
Michigan	38	837	13	3	739	82
Minnesota	9	151	17	0	111	23
Mississippi	8	172	23	0	126	23
Missouri	28	432	10	1	309	112
Montana	5	51	11	0	36	4
Nebraska	5	155	1	0	133	21
Nevada	4	103	14	0	53	36
New Hampshire	6	82	1	0	56	25
New Jersey	23	656	51	0	418	187
New Mexico	9	124	1	0	106	17
New York	63	1,312	109	2	1,000	201
North Carolina	28	770	25	0	513	232
North Dakota	5	47	0	0	38	9
Ohio	34	672	3	12	505	152
Oklahoma	13	182	1	4	165	12
Oregon	11	266	24	0	198	44
Pennsylvania	67	698	27	1	522	148
Puerto Rico	7	194	12	0	163	19
Rhode Island	47	0	2	22	23	
South Carolina	19	262	36	3	155	68
South Dakota	2	18	0	0	10	8
Tennessee	23	409	43	25	268	73
Texas	60	846	74	5	527	240
Utah	8	46	1	0	40	5
Vermont	1	11	4	0	7	0
Virgin Islands	0	0	0	0	0	0
Virginia	40	416	11	2	345	58
Washington	12	406	174	21	186	25
West Virginia	10	118	3	0	98	17
Wisconsin	24	327	11	3	240	73
Wyoming	1	7	0	0	5	2
American Samoa	0	0	0	0	0	0
Guam	0	0	0	0	0	0
Mariana Islands	0	0	0	0	0	0

¹Intermittent peritoneal dialysis.

²Continuous ambulatory peritoneal dialysis.

³Continuous cycling peritoneal dialysis.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1992.

Table 27
Outpatient dialysis treatments given during the calendar year, by State: 1992

State	Facilities reporting	Total ¹ treatments	Hemodialysis	IPD ²
Total	2,222	17,629,892	17,578,766	51,126
Alabama	46	380,032	380,032	0
Alaska	2	9,113	9,113	0
Arizona	45	288,271	288,162	109
Arkansas	36	133,504	133,366	138
California	235	2,133,774	2,133,371	403
Colorado	18	148,805	148,805	0
Connecticut	20	193,819	192,252	1,567
Delaware	6	60,109	60,109	0
District of Columbia	21	164,596	164,583	13
Florida	156	1,058,657	1,057,384	1,273
Georgia	85	603,436	600,363	3,073
Hawaii	12	114,933	114,933	0
Idaho	7	26,885	26,885	0
Illinois	96	807,652	799,827	7,825
Indiana	41	302,213	302,213	0
Iowa	16	112,865	112,787	78
Kansas	18	114,733	114,720	13
Kentucky	31	186,674	186,397	277
Louisiana	71	451,215	451,049	166
Maine	6	38,994	38,994	0
Maryland	57	407,741	407,191	550
Massachusetts	45	354,927	354,693	234
Michigan	57	537,198	534,476	2,722
Minnesota	34	216,915	216,895	20
Mississippi	39	280,271	279,905	366
Missouri	51	327,904	327,124	780
Montana	7	33,965	33,954	11
Nebraska	12	54,686	54,610	76
Nevada	6	56,535	56,493	42
New Hampshire	6	38,185	38,185	0
New Jersey	40	566,382	561,165	5,217
New Mexico	17	110,278	110,278	0
New York	120	1,379,942	1,372,318	7,624
North Carolina	64	545,614	545,447	167
North Dakota	10	34,701	34,701	0
Ohio	57	595,647	594,404	1,243
Oklahoma	41	155,635	155,585	50
Oregon	18	118,551	117,319	1,232
Pennsylvania	105	910,136	908,145	1,991
Puerto Rico	23	217,252	215,775	1,477
Rhode Island	8	76,750	76,750	0
South Carolina	47	355,040	354,336	704
South Dakota	7	27,612	27,612	0
Tennessee	59	389,200	381,850	7,350
Texas	151	1,396,372	1,392,762	3,610
Utah	15	54,143	54,143	0
Vermont	2	12,653	12,653	0
Virgin Islands	1	3,929	3,929	0
Virginia	76	508,051	508,048	3
Washington	22	210,430	209,928	502
West Virginia	14	94,210	94,099	111
Wisconsin	38	202,292	202,183	109
Wyoming	2	5,482	5,482	0
American Samoa	1	4,491	4,491	0
Guam	1	12,951	12,951	0
Mariana Islands	1	3,541	3,541	0

¹Does not include training treatments.

²Intermittent peritoneal dialysis.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1992.

Table 28
Dialysis training treatments given during the calendar year, by State: 1992

State	Facilities reporting	Total training treatments	Hemodialysis	IPD ¹	CAPD ²	CCPD ³
Total	2,222	196,819	28,262	705	133,450	34,402
Alabama	46	2,143	218	0	1,375	550
Alaska	2	147	17	0	119	11
Arizona	45	3,971	1,872	0	1,740	359
Arkansas	36	1,441	19	51	1,221	150
California	235	13,514	816	0	10,822	1,876
Colorado	18	2,805	496	9	1,520	780
Connecticut	20	7,411	94	62	6,839	416
Delaware	6	303	0	0	293	10
District of Columbia	21	757	141	0	524	92
Florida	156	4,759	31	0	3,539	1,189
Georgia	85	3,128	57	18	2,396	657
Hawaii	12	446	86	0	355	5
Idaho	7	269	47	0	131	91
Illinois	96	4,275	153	5	3,357	760
Indiana	41	2,951	212	0	2,600	139
Iowa	16	2,638	865	0	1,525	248
Kansas	18	1,239	63	0	1,070	106
Kentucky	31	1,663	48	25	1,234	356
Louisiana	71	1,938	57	0	1,254	627
Maine	6	198	0	0	106	92
Maryland	57	2,390	430	0	1,723	237
Massachusetts	45	1,914	140	0	1,351	423
Michigan	57	7,037	238	24	6,347	428
Minnesota	34	1,138	100	0	848	190
Mississippi	39	1,319	331	0	849	139
Missouri	51	3,433	152	97	2,294	890
Montana	7	669	200	0	436	33
Nebraska	12	1,086	4	0	933	149
Nevada	6	1,033	395	0	433	205
New Hampshire	6	587	17	0	486	84
New Jersey	40	9,861	1,652	0	5,132	3,077
New Mexico	17	797	25	0	679	93
New York	120	39,715	6,347	39	29,943	3,386
North Carolina	64	25,201	1,612	0	13,969	9,620
North Dakota	10	307	0	0	235	72
Ohio	57	4,674	95	39	3,539	1,001
Oklahoma	41	1,297	21	18	1,219	39
Oregon	18	3,147	1,438	0	1,410	299
Pennsylvania	105	5,456	822	11	3,669	954
Puerto Rico	23	2,980	247	0	2,301	432
Rhode Island	8	324	0	10	177	137
South Carolina	47	2,569	587	0	1,396	586
South Dakota	7	112	0	0	72	40
Tennessee	59	3,351	1,082	121	1,745	403
Texas	151	7,556	1,481	30	4,218	1,827
Utah	15	375	36	0	285	54
Vermont	2	143	86	0	57	0
Virgin Islands	1	0	0	0	0	0
Virginia	76	3,050	283	4	2,445	318
Washington	22	6,495	4,948	114	1,216	217
West Virginia	14	798	96	0	561	141
Wisconsin	38	1,959	105	28	1,424	402
Wyoming	2	50	0	0	38	12
American Samoa	1	0	0	0	0	0
Guam	1	0	0	0	0	0
Mariana Islands	1	0	0	0	0	0

¹Intermittent peritoneal dialysis.

²Continuous ambulatory peritoneal dialysis.

³Continuous cycling peritoneal dialysis.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1992.

Table 29
Kidney transplant activity during the calendar year: 1992

Category	Number	Percentage
Transplants performed at center	10,115	100.0
Living-related donor	2,391	23.6
Living-unrelated donor	145	1.4
Cadaveric donor	7,579	74.9
Patients awaiting transplant	21,618	100.0
Dialysis	19,970	92.4
Nondialysis	1,648	7.6
Patients who received transplant at center	10,101	—
Medicare status	10,101	100.0
Medicare	8,385	83.0
Medicare pending	708	7.0
Non-Medicare		
U.S. resident	860	8.5
Other	148	1.5

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1992.

Table 30
Disposition of cadaveric kidneys, by source: 1992

Source	Total	Disposition of cadaveric kidneys			
		Transplanted at center	Sent to another center	Sent to foreign center	Nonviable kidneys
Total	10,432	7,665	2,364	10	393
Harvested at center	2,631	1,055	1,398	9	169
Obtained from other transplant hospital	680	583	87	0	10
Obtained from independent organ procurement organization	4,643	4,467	96	0	80
Obtained from non-transplant hospital	2,478	1,560	783	1	134
Non-viable kidneys	393	—	—	—	—
Used for research	130	—	—	—	—
Discarded	263	—	—	—	—

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1992.

Table 31
Kidney transplant center patient eligibility status, by State: 1992

State	Centers reporting	Total transplant patients	Currently enrolled in Medicare	Medicare application pending	Non-Medicare	
					U.S. resident	Other
Total	228	10,101	8,385	708	860	148
Alabama	2	246	223	15	8	0
Arizona	5	109	81	4	20	4
Arkansas	3	94	90	1	3	0
California	23	1,239	959	87	157	36
Colorado	4	109	95	2	12	0
Connecticut	2	92	84	0	7	1
District of Columbia	5	209	150	3	47	9
Florida	7	468	433	26	6	3
Georgia	4	268	197	71	0	0
Hawaii	1	37	35	2	0	0
Illinois	8	337	280	6	32	19
Indiana	2	168	141	10	15	2
Iowa	3	95	76	5	13	1
Kansas	2	59	41	18	0	0
Kentucky	3	141	121	4	15	1
Louisiana	7	175	162	8	5	0
Maine	1	31	30	0	1	0
Maryland	3	168	128	0	40	0
Massachusetts	10	325	245	36	34	10
Michigan	10	407	364	32	11	0
Minnesota	4	372	304	56	10	2
Mississippi	1	13	11	0	0	2
Missouri	9	225	187	11	26	1
Nebraska	3	78	69	6	2	1
Nevada	2	41	32	2	3	4
New Hampshire	1	4	4	0	0	0
New Jersey	3	132	125	0	6	1
New Mexico	2	51	34	4	12	1
New York	15	614	525	30	55	4
North Carolina	5	217	212	4	1	0
North Dakota	3	29	25	4	0	0
Ohio	12	589	474	32	82	1
Oklahoma	6	109	92	13	4	0
Oregon	1	134	112	21	1	0
Pennsylvania	11	752	549	60	126	17
Puerto Rico	1	38	34	0	1	3
South Carolina	1	113	106	4	1	2
Tennessee	8	256	225	16	14	1
Texas	17	714	618	29	47	20
Utah	2	114	82	27	5	0
Vermont	1	0	0	0	0	0
Virginia	5	175	145	7	22	1
Washington	5	196	176	13	7	0
West Virginia	2	41	41	0	0	0
Wisconsin	3	317	268	39	9	1

NOTE: The following States have no Medicare-approved transplant centers: Alaska, Delaware, Idaho, Montana, Rhode Island, South Dakota, Wyoming, American Samoa, Guam, Virgin Islands, and Mariana Islands.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1992.

Table 32
Number of kidney transplants performed and type of donor, by State: 1992

State	Centers reporting	Total patients	Total transplants	Living-related		Living-unrelated		Cadaveric	
				Total	Percent	Total	Percent	Total	Percent
Total	228	10,101	10,115	2,391	23.6	145	1.4	7,579	74.9
Alabama	2	246	247	67	27.1	7	2.8	173	70.0
Arizona	5	109	109	19	17.4	1	0.9	89	81.7
Arkansas	3	94	94	36	38.3	0	0.0	58	61.7
California	23	1,239	1,242	266	21.4	19	1.5	957	77.1
Colorado	4	109	109	16	14.7	0	0.0	93	85.3
Connecticut	2	92	92	30	32.6	0	0.0	62	67.4
District of Columbia	5	209	209	66	31.6	7	3.3	136	65.1
Florida	7	468	468	80	17.1	1	0.2	387	82.7
Georgia	4	268	268	80	29.9	9	3.4	179	66.8
Hawaii	1	37	37	4	10.8	0	0.0	33	89.2
Illinois	8	337	338	63	18.6	4	1.2	271	80.2
Indiana	2	168	168	43	25.6	0	0.0	125	74.4
Iowa	3	95	95	22	23.2	1	1.1	72	75.8
Kansas	2	59	59	11	18.6	1	1.7	47	79.7
Kentucky	3	141	141	29	20.6	1	0.7	111	78.7
Louisiana	7	175	175	37	21.1	0	0.0	138	78.9
Maine	1	31	31	7	22.6	0	0.0	24	77.4
Maryland	3	168	169	37	21.9	4	2.4	128	75.7
Massachusetts	10	325	325	104	32.0	7	2.2	214	65.8
Michigan	10	407	408	118	28.9	12	2.9	278	68.1
Minnesota	4	372	374	128	34.2	10	2.7	236	63.1
Mississippi	1	13	13	2	15.4	0	0.0	11	84.6
Missouri	9	225	225	55	24.4	4	1.8	166	73.8
Nebraska	3	78	78	10	12.8	0	0.0	68	87.2
Nevada	2	41	41	9	22.0	2	4.9	30	73.2
New Hampshire	1	4	4	1	25.0	0	0.0	3	75.0
New Jersey	3	132	132	6	4.5	0	0.0	126	95.5
New Mexico	2	51	53	5	9.4	0	0.0	48	90.6
New York	15	614	614	151	24.6	10	1.6	453	73.8
North Carolina	5	217	217	55	25.3	3	1.4	159	73.3
North Dakota	3	29	29	10	34.5	7	24.1	12	41.4
Ohio	12	589	589	112	19.0	3	0.5	474	80.5
Oklahoma	6	109	110	22	20.0	0	0.0	88	80.0
Oregon	1	134	134	35	26.1	0	0.0	99	73.9
Pennsylvania	11	752	752	113	15.0	8	1.1	631	83.9
Puerto Rico	1	38	38	23	60.5	6	15.8	9	23.7
South Carolina	1	113	113	28	24.8	0	0.0	85	75.2
Tennessee	8	256	256	83	32.4	3	1.2	170	66.4
Texas	17	714	714	185	25.9	2	0.3	527	73.8
Utah	2	114	114	41	36.0	1	0.9	72	63.2
Vermont	1	0	0	0	0.0	0	0.0	0	0.0
Virginia	5	175	175	35	20.0	4	2.3	136	77.7
Washington	5	196	196	64	32.7	0	0.0	132	67.3
West Virginia	2	41	41	6	14.6	0	0.0	35	85.4
Wisconsin	3	317	319	77	24.1	8	2.5	234	73.4

NOTE: Percents may not add to total because of rounding. The following States have no Medicare-approved kidney transplant centers: Alaska, Delaware, Idaho, Montana, Rhode Island, South Dakota, Wyoming, American Samoa, Guam, Virgin Islands and Mariana Islands.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1992.

Table 33
Distribution of kidney transplants and number of transplants, by State: 1992

State	Centers reporting	Total transplants	0-15		16-50		51-100		101-200		201 or more	
			Total	Percent	Total	Percent	Total	Percent	Total	Percent	Total	Percent
Total	228	10,115	62	27.2	87	38.2	61	26.8	16	7.0	3	1.3
Alabama	2	247	1	50.0	0	0.0	0	0.0	0	0.0	1	50.0
Arizona	5	109	4	80.0	0	0.0	1	20.0	0	0.0	0	0.0
Arkansas	3	94	1	33.3	1	33.3	1	33.3	0	0.0	0	0.0
California	23	1,242	5	21.7	13	56.5	2	8.7	4	17.4	0	0.0
Colorado	4	109	1	25.0	2	50.0	1	25.0	0	0.0	0	0.0
Connecticut	2	92	0	0.0	1	50.0	1	50.0	0	0.0	0	0.0
District of Columbia	5	209	3	60.0	1	20.0	0	0.0	1	20.0	0	0.0
Florida	7	468	1	14.3	2	28.6	2	28.6	2	28.6	0	0.0
Georgia	4	268	1	25.0	0	0.0	2	50.0	1	25.0	0	0.0
Hawaii	1	37	0	0.0	1	100.0	0	0.0	0	0.0	0	0.0
Illinois	8	338	3	37.5	1	12.5	4	50.0	0	0.0	0	0.0
Indiana	2	168	0	0.0	0	0.0	1	50.0	1	50.0	0	0.0
Iowa	3	95	2	66.7	0	0.0	1	33.3	0	0.0	0	0.0
Kansas	2	59	0	0.0	2	100.0	0	0.0	0	0.0	0	0.0
Kentucky	3	141	1	33.3	0	0.0	2	66.7	0	0.0	0	0.0
Louisiana	7	175	2	28.6	5	71.4	0	0.0	0	0.0	0	0.0
Maine	1	31	0	0.0	1	100.0	0	0.0	0	0.0	0	0.0
Maryland	3	169	0	0.0	2	66.7	1	33.3	0	0.0	0	0.0
Massachusetts	10	325	2	20.0	5	50.0	3	30.0	0	0.0	0	0.0
Michigan	10	408	2	20.0	5	50.0	2	20.0	1	10.0	0	0.0
Minnesota	4	374	1	25.0	0	0.0	2	50.0	0	0.0	1	25.0
Mississippi	1	13	1	100.0	0	0.0	0	0.0	0	0.0	0	0.0
Missouri	9	225	4	44.4	3	33.3	2	22.2	0	0.0	0	0.0
Nebraska	3	78	2	66.7	0	0.0	1	33.3	0	0.0	0	0.0
Nevada	2	41	0	0.0	2	100.0	0	0.0	0	0.0	0	0.0
New Hampshire	1	4	1	100.0	0	0.0	0	0.0	0	0.0	0	0.0
New Jersey	3	132	0	0.0	1	33.3	2	66.7	0	0.0	0	0.0
New Mexico	2	53	0	0.0	2	100.0	0	0.0	0	0.0	0	0.0
New York	15	614	4	26.7	4	26.7	7	46.7	0	0.0	0	0.0
North Carolina	5	217	0	0.0	3	60.0	2	40.0	0	0.0	0	0.0
North Dakota	3	29	3	100.0	0	0.0	0	0.0	0	0.0	0	0.0
Ohio	12	589	3	25.0	4	33.3	4	33.3	1	8.3	0	0.0
Oklahoma	6	110	3	50.0	3	50.0	0	0.0	0	0.0	0	0.0
Oregon	1	134	0	0.0	0	0.0	0	0.0	1	100.0	0	0.0
Pennsylvania	11	752	2	18.2	3	27.3	4	36.4	2	18.2	0	0.0
Puerto Rico	1	38	0	0.0	1	100.0	0	0.0	0	0.0	0	0.0
South Carolina	1	113	0	0.0	0	0.0	0	0.0	1	100.0	0	0.0
Tennessee	8	256	2	25.0	4	50.0	2	25.0	0	0.0	0	0.0
Texas	17	714	2	11.8	8	47.1	6	35.3	1	5.9	0	0.0
Utah	2	114	0	0.0	1	50.0	1	50.0	0	0.0	0	0.0
Vermont	1	0	1	100.0	0	0.0	0	0.0	0	0.0	0	0.0
Virginia	5	175	1	20.0	3	60.0	1	20.0	0	0.0	0	0.0
Washington	5	196	1	20.0	2	40.0	2	40.0	0	0.0	0	0.0
West Virginia	2	41	1	50.0	1	50.0	0	0.0	0	0.0	0	0.0
Wisconsin	3	319	1	33.3	0	0.0	1	33.3	0	0.0	1	33.3

NOTE: Percentages may not add to total due to rounding. The following States have no Medicare-approved kidney transplant centers: Alaska, Delaware, Idaho, Montana, Rhode Island, South Dakota, Wyoming, American Samoa, Guam, Virgin Islands, and Mariana Islands.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1992.

Table 34
Dialysis patients by profit and nonprofit providers, by State: 1992

State	Total Dialysis Patients	Hospital dialysis facility		Independent dialysis facility	
		Profit	Nonprofit	Profit	Nonprofit
Total	157,354	675	47,386	90,558	18,735
Alabama	3,275	0	374	2,646	255
Alaska	90	0	0	0	90
Arizona	2,559	0	129	1,732	698
Arkansas	1,237	0	334	859	44
California	17,904	2	3,047	12,983	1,872
Colorado	1,387	0	307	1,080	0
Connecticut	1,924	0	1,239	685	0
Delaware	538	11	0	527	0
District of Columbia	1,372	0	377	899	96
Florida	8,737	66	665	6,771	1,235
Georgia	5,314	0	720	3,879	715
Hawaii	894	0	560	334	0
Idaho	264	0	253	0	11
Illinois	7,099	0	2,528	4,490	81
Indiana	3,275	0	1,493	1,782	0
Iowa	1,143	0	763	240	140
Kansas	1,106	0	99	913	94
Kentucky	1,797	0	229	1,021	547
Louisiana	3,772	0	463	3,279	30
Maine	346	0	127	219	0
Maryland	3,445	0	621	2,256	568
Massachusetts	3,060	0	1,208	1,658	194
Michigan	5,405	0	2,621	1,759	1,025
Minnesota	1,852	0	1,220	52	580
Mississippi	2,286	0	212	754	1,320
Missouri	3,104	29	863	1,175	1,037
Montana	329	0	314	0	15
Nebraska	715	0	497	119	99
Nevada	560	0	133	427	0
New Hampshire	377	0	147	230	0
New Jersey	5,511	59	4,226	1,135	91
New Mexico	1,012	134	256	519	103
New York	12,655	0	7,416	3,403	1,836
North Carolina	5,173	0	391	4,706	76
North Dakota	318	9	309	0	0
Ohio	5,850	127	3,028	1,599	1,096
Oklahoma	1,490	0	766	724	0
Oregon	1,253	0	698	555	0
Pennsylvania	7,901	36	2,425	4,510	930
Puerto Rico	2,174	0	502	1,672	0
Rhode Island	608	0	13	511	84
South Carolina	2,880	0	23	2,418	439
South Dakota	222	0	222	0	0
Tennessee	3,427	0	317	1,838	1,272
Texas	11,608	134	1,226	9,713	535
Utah	465	32	184	117	132
Vermont	127	0	127	0	0
Virgin Island	38	0	38	0	0
Virginia	4,367	0	935	3,355	77
Washington	2,052	0	936	0	1,116
West Virginia	838	36	356	270	176
Wisconsin	2,016	0	1,319	697	0
Wyoming	47	0	0	47	0
American Samoa	31	0	31	0	0
Guam	99	0	99	0	0
Mariana Islands	26	0	0	0	26

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from End Stage Renal Disease Facility Survey, 1992.

Table 35
Dialysis patients receiving care by type of facility: 1982-92¹

Year	Total patients	Independent dialysis facility				Hospital dialysis facility			
		Outpatients	Percent change	Home patients	Percent change	Outpatients	Percent change	Home patients	Percent change
1982	65,765	30,413	—	3,805	—	23,619	—	7,928	—
1983	71,987	35,001	15.1	5,162	35.7	23,341	-1.8	8,483	7.0
1984	78,483	39,015	11.5	6,067	17.5	24,230	3.8	9,171	8.1
1985	84,797	42,921	10.0	6,896	13.7	25,473	5.1	9,507	3.7
1986	90,886	47,435	10.5	7,467	8.3	26,365	3.5	9,619	1.2
1987	98,432	52,459	10.6	8,356	11.9	27,690	5.0	9,927	3.2
1988	105,958	58,371	11.3	8,930	6.9	28,824	4.1	9,933	-1.0
1989	116,169	65,643	12.5	10,095	13.0	30,305	5.1	10,126	3.0
1990	129,800	74,377	13.3	11,849	17.4	32,783	8.2	10,791	6.6
1991	142,488	82,690	11.2	13,535	14.2	34,681	5.8	11,582	7.3
1992	157,354	93,036	12.5	16,257	20.1	36,166	4.3	11,895	2.7
Average annual percent change									
1982-92	—	—	11.8	—	15.6	—	4.4	—	4.1

¹Counts are as of December 31 of each year from End Stage Renal Disease Facility Surveys.

NOTE: Average annual percent change calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from End Stage Renal Disease Facility Survey, 1982-92

Department of Veterans Affairs dialysis statistics

As of December 31, 1992, there were 83 Department of Veterans Affairs (DVA) dialysis centers providing services to dialysis patients. The statistics displayed in Table 36 include 520 patients (all of whom were on chronic dialysis) who were dialyzing at 12 Medicare-approved Department of Veterans Affairs facilities. Data on the number of continuous ambulatory peritoneal dialysis (CAPD) or continuous cycling peritoneal dialysis (CCPD) patients are not captured as a separate category by the DVA, but are included with other peritoneal dialysis patients.

The data displayed in Table 36 reflect counts taken on December 31 for years 1988 through 1992 and include dialysis center satellite and contract fee dialysis patient counts. The number of DVA dialysis patients decreased 10.5 percent between 1988 and 1992 (3,722 and 3,332, respectively). However, the total number of DVA dialysis patients remained relatively stable since 1989. The number of staff-assisted hemodialysis patients in DVA dialysis centers increased from 1,889 in 1988 to 1,985 in 1992—an increase of 5.1 percent. The number of patients dialyzing at home declined 23.8 percent from 1988 to 1992 (860 and 655, respectively).

Table 36
Number of patients for Department of Veterans Affairs dialysis facilities, by type of dialysis: 1988-92

Type of dialysis	All patients					Percent change 1988-92
	1988	1989	1990	1991	1992	
All modalities	3,722	3,389	3,293	3,433	3,332	-10.5
Staff-assisted	1,934	1,944	1,924	2,021	2,024	4.7
Hemodialysis	1,889	1,828	1,865	1,976	1,985	5.1
Peritoneal dialysis	45	116	59	45	39	13.3
Home	860	720	712	703	655	-23.8
Hemodialysis	378	293	259	190	168	-55.6
Peritoneal dialysis	482	427	453	513	487	1.0
Contract	590	511	427	496	456	-22.7
Hemodialysis	558	487	409	470	434	-22.2
Peritoneal dialysis	32	24	18	26	22	-31.3
Limited	121	73	88	78	75	-38.0
Hemodialysis	121	69	84	70	66	-45.5
Peritoneal dialysis	0	4	4	8	9	100.0
Acute	186	123	129	124	116	-37.6
Hemodialysis	177	120	123	120	112	-36.7
Peritoneal dialysis	9	3	6	4	4	-55.6
In training	31	18	13	11	6	-80.6
Hemodialysis training	21	9	5	4	0	-100.0
Peritoneal dialysis training	10	9	8	7	6	-40.0

SOURCE: Department of Veterans Affairs; Data from the Veterans Health Administration, Medical Service, Office of Clinical Programs, 1988-92.

Survival analyses

Program experience with respect to both patient and graft survival from onset of renal failure, or from date of kidney transplant, to 5 years subsequent is discussed in this section. This analysis covered the period from January 1, 1987 through December 31, 1991. All Medicare beneficiaries with renal failure occurring on or after January 1, 1987 through December 31, 1991 were included in the analysis of dialysis survival (N=197,139). The transplant survival analysis included Medicare beneficiaries whose transplants occurred on or after January 1, 1987 through December 31, 1991. The total number of persons included in the computation of transplant survival was 42,675 (33,688 cadaveric donor transplants and 8,987 living-related donor transplants)¹. Patient and graft survival were tracked through April 30, 1993.

Data

The computation of survival rates for dialysis patients requires a date of renal failure onset along with the date of death or the date of transplantation (if the patient was subsequently transplanted). Computation of survival rates for transplant patients requires the date of transplantation and the date of death (for patient survival) or the date of graft failure (for graft survival). The date of renal failure onset was defined as the date of first dialysis and was taken from the patients' medical evidence records (HCFA-2728) or the outpatient dialysis records (HCFA-1450). In the absence of these records, the date of renal failure onset was estimated from the entitlement records. The date of death was obtained from the Master Beneficiary Records that are maintained for all Medicare beneficiaries. The date of transplant was obtained from the transplant form (HCFA-2745) or from the inpatient hospital bill (HCFA-1450). The date of transplant failure was either obtained from the transplant follow-up form, calculated based on a record of outpatient dialysis sessions, or based on the date of a subsequent transplant.

Survival rates were calculated using a standard actuarial modified life-table analysis. For dialysis patients, survival was measured beginning 90 days following the date of renal failure onset until death, with right censoring for transplantation or the end of the observation period (April 30, 1993). The 90 day lag in calculation of the start date was included to avoid the potential bias of excluding persons who died during the interval between renal failure and Medicare entitlement. For transplants, patient survival was measured from the

date of transplantation until graft failure or death, with right censoring for the end of the observation period.

Because it has been found that there are significant age differences among the population subgroups (for example, white persons on dialysis are generally older than black persons on dialysis and persons whose renal failure is due to hypertension are generally older than persons whose renal failure is due to diabetes), the survival rates for each sex, race, and primary diagnostic subgroup were age-adjusted to the age distribution for all persons in each table. For example, survival rates for males and females on dialysis were age-adjusted to the age distribution for all persons on dialysis. Individual survival rates among cadaveric donor transplants were age-adjusted to all cadaveric donor transplants, and individual survival rates among living-related donor transplants were age-adjusted to all living-related donor transplants. Therefore, survival differences due to age were largely eliminated.

Results

The results of the analysis of dialysis patient survival are presented in Table 37. At 1 year from the 90 day offset following renal failure onset, 78.1 percent of patients were still alive. At 3 years this had decreased to 50.6 percent and at 5 years to 33.7 percent. There were notable differences by age group. The two groups comprised of persons less than 25 years of age at the time of renal failure had similar 1-year survival rates of 93.4 percent for persons under 15 years of age, and 94.9 percent for persons 15 to 24 years of age. These two groups maintained the highest survival rates across the 5 year span. By 5 years after renal failure, persons under 15 years of age had the highest survival rate of all age groups at 81.4 percent. The rate of survival decreased for each older age cohort. For those over 75 years of age, the 1-year survival rate, was only 61.3 percent; slightly more than one-quarter (26.3 percent) survived 3 years; and only 10.9 percent survived 5 years on dialysis after renal failure. At the end of 1 year, the survival rate for females was 1.6 percent greater than the rate for males (79.0 percent and 77.4 percent, respectively). At 3 years, females had a cumulative survival rate that was 2.8 percentage points greater than the survival rate for males (52.1 percent and 49.3 percent, respectively). At the end of the fifth year, the survival rate for female dialysis patients was 2.5 percentage points greater than the rate for males (35.0 percent and 32.5 percent, respectively). By racial group, the highest survival rates for dialysis patients after 1 year were found among Asians (83.9 percent), and black persons and American Indians, each at 81.8 percent. White persons had the lowest 1 year survival rate at 76.4 percent. For all 5 years, Asian persons maintained the highest survival rates, while the survival rate for white persons remained the lowest. In terms of the reported cause of renal failure (i.e., the

¹The HCFA transplant reporting form (HCFA-2745) does not distinguish between living-related and living-unrelated donors. Depending upon specific reporting procedures at the transplant hospitals, living-unrelated donors may be included in the living-related category or the cadaveric category. Given the small number of such cases, it is expected that the outcome of the analyses will not be affected to any great extent.

primary diagnosis) for dialysis patients, the lowest survival rates were found among those patients with diabetes. At 1 year, the survival rate for the diabetic group (75.2 percent) was 2.7 percentage points lower than the next lowest group—those for whom renal failure was attributed to obstructive nephropathy (77.9 percent). By year 5, the survival rate for the diabetic group had decreased to 23.4 percent, 14.7 percentage points lower than the next lowest group, persons whose renal failure was attributed to hypertension (38.1 percent). The highest survival rate for year 5 was found for those patients with polycystic kidney disease (51.6 percent). The 5-year survival rate for those with glomerulonephritis was 42.4 percent; for those with interstitial nephritis it was 41.2 percent; and for those with obstructive nephropathy it was 41.6 percent.

Patient survival rates for persons with cadaver donor transplants and living-related donor transplants are presented in Tables 38 and 39, respectively. Among cadaver donor transplant patients, survival rates were 92.8 percent at 1 year, 85.9 percent at 3 years, and 77.6 percent at 5 years. The data show that the likelihood of patient survival decreased with advancing age. The 3-year survival rate was 92.4 percent for persons under 15 years of age and 93.9 percent for persons 15 to 24 years of age, falling to 72.2 percent for persons 65 to 74 years of age. The 5-year survival rate for cadaver donor transplant patients was 90.5 percent for persons under 15 years of age and 89.6 percent for those 15 to 24 years of age, decreasing to 57.0 percent for persons 65 to 74 years of age. Females had a higher survival rate than did males after a cadaver donor transplant. At year 1, the female survival rate (93.4 percent) exceeded the male survival rate (92.4 percent) by 1.0 percentage point. By year 5, the female survival rate (79.7 percent) exceeded the male survival rate (76.4 percent) by 3.3 percentage points. The three year survival rates for cadaver donor transplant patients ranged from a high of 87.6 percent for Asian persons to a low of 84.4 percent for American Indians. By year 5 post transplant, American Indians experienced the highest survival rate (81.7 percent). The lowest survival rate at 5 years was experienced by black persons (76.4 percent). In terms of the reported cause of renal failure for cadaver donor transplants, the lowest survival rates across the 5 years reported were found for those patients with diabetes. At year 1, the survival rate for the diabetic group (88.9 percent) was 3.8 percentage points lower than the next lowest group which was those for whom renal failure was attributed to obstructive nephropathy (92.7 percent). By year 5, the survival rate for the diabetic group had declined to 65.9 percent. This was 11.6 percentage points lower than the next lowest category, the hypertension group, which had a survival rate of 77.5 percent. The highest 5-year survival rate was experienced by persons whose renal failure was attributed to polycystic kidney disease (86.3 percent). Of all cadaver transplants performed between 1987 and 1991, 85.7 percent were first transplants. Patient survival was higher for first transplants than for subsequent transplants at 5 years post transplant (77.9 percent and 75.3 percent, respectively).

Among living-related donor transplant patients, the survival rate for year 1 was 96.8 percent, for year 3 was 93.2 percent, and for year 5 was 88.9 percent (Table 39). As with cadaver donor recipients, survival for living-related donor transplant patients decreased with age. At year 1, all age groups, with the exception of the 65 to 74 years of age group, had survival rates that exceeded 90 percent. At year 3, the survival rate for those people under 45 years of age still exceeded 93 percent. Finally, in year 5, the survival rate for those under 35 years of age continued to be higher than 90 percent, while the rate for all others was under 90 percent. The 5 year survival rate for those persons between 65 and 74 years of age was 63.0 percent. The survival rates for females were comparable to that for males, across the 5 years. The largest difference occurred in year 5, when the female rate (88.6 percent) was 0.5 percentage points lower than the male rate (89.1 percent). At year 5, the survival rate for Asian persons was 95.3 percent, followed by white persons at 89.4 percent, American Indians at 88.6 percent, and black persons at 85.2 percent. As with dialysis and cadaver donor transplant recipients, the survival rate for living-related donor transplant patients was lower for persons for whom diabetes was found to be the primary cause of renal failure. By year 5, the survival rate for the diabetic group (83.6 percent) was 4.7 percentage points lower than the rate for the next lower group—the hypertensive group (88.3 percent). Living-related donor transplants as subsequent transplants were fairly unusual and accounted for only 6.8 percent of living-related donor transplants. Patient survival at 5 years was lower (85.8 percent) for subsequent living-related donor transplants than for first living-related donor transplants (89.1 percent).

Kidney graft survival rates for cadaveric transplants and living-related donor transplants are presented in Tables 40 and 41, respectively. Among cadaver donor transplants, 78.9 percent of the kidney grafts survived for at least 1 year; 66.7 percent survived 3 years; and 56.6 percent were still functioning at year 5. The under 15 years of age group experienced the lowest 1 year graft survival rate (74.1 percent). At 5 years post transplant, graft survival rates ranged from a low of 50.4 percent for persons 65 to 74 years of age to a high of 57.5 percent for persons under 15 years of age. At year 1, graft survival rates for males and females were about the same. However, by year 5, the female survival rate (57.5 percent) exceeded the male survival rate (56.1 percent) by 1.4 percentage points. Asian persons experienced the highest cadaver donor graft survival rates for all years except for year 5 when American Indians had a higher graft survival (60.1 percent and 61.6, respectively). By year 5, white persons had a graft survival rate of 59.8 percent, followed by black persons at 45.2 percent. By reported cause of renal failure, the lowest 3-year graft survival rate for cadaver donor transplants was found among those people for whom the primary cause of renal failure was attributed to hypertension (60.2 percent). The highest 3-year survival rates were found for those persons with polycystic kidney disease (73.0 percent), obstructive nephropathy (71.6 percent), and interstitial nephritis (70.8 percent).

By year 5, the survival rate for the hypertensive group had declined to 46.8 percent, still the lowest survival rate. The highest 5-year cadaver donor graft survival rate was found for persons with a primary diagnosis of polycystic kidney disease (64.9 percent), followed by obstructive nephropathy (64.6 percent) and interstitial nephritis (62.9 percent). First cadaver transplants had a higher first year graft survival rate than subsequent cadaver transplants (79.8 percent and 73.0 percent, respectively). At 5 years post transplant, graft survival was 57.5 percent for first cadaver transplants and 50.8 percent for subsequent cadaver transplants.

Among living-related donor transplants (Table 41), 90.0 percent of the kidney grafts survived to year 1; 82.6 percent survived to year 3; and 75.3 percent survived to year 5. At year 1, graft survival ranged between 80.0 percent (65 to 74 years of age group) and 91.3 percent (15 to 24 years of age group). At 5 years post transplant, most age groups had about 75 percent of grafts still functioning. Lower 5 year graft survival rates were evident for persons 55 to 64 years of age (67.2 percent) and 65 to 74 years of age (59.2 percent). Graft survival rates were similar for males and females at each of the 5 year periods. One year graft survival for living-related donor transplants was highest for American Indians (96.0 percent) and Asians (93.2 percent) and was lowest for black persons (86.4 percent). The highest

5-year survival rate was found for Asian persons (84.8 percent) followed by white persons (77.3 percent), American Indians (76.4 percent), and black persons (60.2 percent).

By primary diagnosis category, the 1- and 5-years graft survival rates for living-related donor transplants were, as with cadaver grafts, lowest for persons whose renal failure was attributed to hypertension (88.5 percent and 63.6 percent, respectively). The highest 3-year graft survival rates were found for those persons with a primary diagnosis of obstructive nephropathy (90.7 percent) and those with polycystic kidney disease (85.5 percent). The highest 5-year graft survival rates were found for those persons with obstructive nephropathy (84.0 percent) and polycystic kidney disease (80.8 percent).

The difference in graft survival rates for living-related donor transplants between first and subsequent transplants increased over the 5 years reported. The one year graft survival rate was 5.8 percentage points higher for first living-related donor transplants than for subsequent living-related donor transplants (90.3 percent and 84.5 percent, respectively). At five years, 75.7 percent of first living-related donor grafts were functioning, compared to 67.5 percent of subsequent living-rated donor grafts, a difference of 8.2 percentage points.

Table 37
Dialysis patient survival, by age, sex, race, and primary diagnosis: 1987-91

Age, sex, race, and primary diagnosis	Total	Percent surviving				
		1 year	2 years	3 years	4 years	5 years
All persons	197,139	78.1 (0.1)	62.7 (0.1)	50.6 (0.1)	41.1 (0.2)	33.7 (0.2)
Age						
Under 15 years	1,926	93.4 (0.7)	89.6 (1.0)	85.7 (1.4)	82.5 (1.8)	81.4 (2.1)
15 - 24 years	5,733	94.9 (0.3)	90.6 (0.5)	86.1 (0.7)	81.7 (0.9)	76.6 (1.3)
25 - 34 years	15,238	90.1 (0.3)	80.5 (0.4)	72.8 (0.5)	66.0 (0.6)	59.5 (0.9)
35 - 44 years	22,522	88.6 (0.2)	78.0 (0.3)	68.8 (0.4)	60.3 (0.5)	52.6 (0.7)
45 - 54 years	27,975	86.4 (0.2)	73.7 (0.3)	62.1 (0.4)	52.0 (0.4)	44.4 (0.5)
55 - 64 years	43,424	79.5 (0.2)	63.6 (0.3)	50.6 (0.3)	39.9 (0.3)	31.2 (0.4)
65 - 74 years	51,118	71.4 (0.2)	52.6 (0.2)	38.3 (0.3)	28.0 (0.3)	20.3 (0.3)
75 years or over	29,203	61.3 (0.3)	40.0 (0.3)	26.3 (0.3)	17.0 (0.3)	10.9 (0.3)
Sex						
Male	106,459	77.4 (0.1)	61.6 (0.2)	49.3 (0.2)	39.9 (0.2)	32.5 (0.3)
Female	90,680	79.0 (0.1)	63.9 (0.2)	52.1 (0.2)	42.5 (0.2)	35.0 (0.3)
Race						
Asian	3,934	83.9 (0.6)	70.9 (0.8)	59.6 (1.0)	51.5 (1.2)	44.9 (1.4)
Black	57,994	81.8 (0.2)	68.0 (0.2)	56.7 (0.2)	47.2 (0.3)	39.2 (0.3)
White	129,561	76.4 (0.1)	60.0 (0.2)	47.3 (0.2)	37.5 (0.2)	30.2 (0.2)
American Indian	2,442	81.8 (0.8)	65.7 (1.0)	53.3 (1.2)	44.0 (1.5)	37.3 (1.8)
Other/Unknown	3,208	80.0 (0.7)	64.6 (0.9)	52.7 (1.0)	43.1 (1.2)	37.4 (1.4)
Primary diagnosis						
Diabetes	65,882	75.2 (0.2)	56.1 (0.2)	41.8 (0.2)	31.2 (0.3)	23.4 (0.3)
Glomerulonephritis	25,770	83.6 (0.2)	70.9 (0.3)	59.5 (0.4)	50.1 (0.5)	42.4 (0.6)
Hypertension	54,119	79.9 (0.2)	66.1 (0.2)	55.0 (0.3)	46.0 (0.3)	38.1 (0.3)
Polycystic kidney disease	6,305	89.7 (0.4)	80.0 (0.6)	70.3 (0.8)	60.1 (1.0)	51.6 (1.2)
Interstitial nephritis	6,239	81.7 (0.5)	69.3 (0.7)	58.9 (0.8)	49.5 (0.9)	41.2 (1.0)
Obstructive nephropathy	4,131	77.9 (0.7)	65.6 (0.8)	56.6 (0.9)	49.0 (1.0)	41.6 (1.2)
Other	11,577	68.9 (0.4)	54.1 (0.5)	43.6 (0.6)	35.5 (0.7)	29.9 (0.8)
Unknown	11,749	78.3 (0.4)	64.0 (0.5)	52.7 (0.6)	43.3 (0.6)	36.0 (0.7)
Not reported	11,367	79.5 (0.4)	65.5 (0.5)	54.6 (0.6)	46.0 (0.7)	39.9 (0.8)

NOTES: Numbers in parentheses represent the standard error of the estimate for each value. Rates based on fewer than 30 observations are not displayed. Survival rates for individual sex, race, and primary diagnosis groups were age-adjusted to the age distribution of all dialysis patients.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1993 update, 1987-91.

Table 38

Cadaver donor transplant patient survival, by age, sex, race, and primary diagnosis: 1987-91

Age, sex, race, and primary diagnosis	Total	Percent surviving				
		1 year	2 years	3 years	4 years	5 years
All persons	33,688	92.8 (0.1)	89.4 (0.2)	85.9 (0.2)	82.1 (0.2)	77.6 (0.3)
Age						
Under 15 years	920	94.5 (0.8)	93.3 (0.8)	92.4 (0.9)	91.7 (1.0)	90.5 (1.1)
15 - 24 years	2,821	97.0 (0.3)	95.7 (0.4)	93.9 (0.5)	92.0 (0.6)	89.6 (0.8)
25 - 34 years	7,130	95.3 (0.3)	92.9 (0.3)	90.7 (0.4)	87.5 (0.5)	84.7 (0.6)
35 - 44 years	9,345	93.6 (0.3)	90.4 (0.3)	87.1 (0.4)	83.4 (0.5)	78.8 (0.6)
45 - 54 years	7,506	91.6 (0.3)	87.4 (0.4)	83.3 (0.5)	79.0 (0.6)	74.1 (0.7)
55 - 64 years	4,863	88.5 (0.5)	83.3 (0.6)	78.1 (0.6)	72.8 (0.8)	65.9 (1.0)
65 - 74 years	1,076	84.5 (1.1)	78.9 (1.3)	72.2 (1.5)	64.9 (1.8)	57.0 (2.3)
75 years or over	27	—	—	—	—	—
Sex						
Male	20,674	92.4 (0.2)	88.9 (0.2)	85.2 (0.3)	81.1 (0.3)	76.4 (0.4)
Female	13,014	93.4 (0.2)	90.2 (0.3)	87.1 (0.3)	83.8 (0.4)	79.7 (0.5)
Race						
Asian	866	93.0 (0.9)	90.1 (1.0)	87.6 (1.2)	84.0 (1.4)	79.4 (1.8)
Black	7,616	93.2 (0.3)	89.3 (0.4)	85.5 (0.4)	81.6 (0.5)	76.4 (0.7)
White	24,636	92.6 (0.2)	89.4 (0.2)	85.9 (0.2)	82.1 (0.3)	77.8 (0.4)
American Indian	359	90.1 (1.6)	88.3 (1.8)	84.4 (2.1)	82.6 (2.3)	81.7 (2.4)
Other/Unknown	211	97.9 (0.9)	96.6 (1.5)	94.1 (1.6)	92.5 (2.1)	92.5 (2.8)
Primary diagnosis						
Diabetes	7,112	88.9 (0.4)	83.5 (0.4)	78.5 (0.5)	72.8 (0.6)	65.9 (0.8)
Glomerulonephritis	8,745	93.8 (0.3)	91.3 (0.3)	89.0 (0.4)	85.3 (0.4)	81.8 (0.5)
Hypertension	5,082	93.7 (0.4)	90.4 (0.5)	86.2 (0.6)	82.4 (0.7)	77.5 (0.8)
Polycystic kidney disease	2,851	94.7 (0.5)	93.0 (0.5)	91.4 (0.6)	88.7 (0.7)	86.3 (0.9)
Interstitial nephritis	1,365	94.7 (0.6)	91.7 (0.8)	89.8 (0.9)	87.1 (1.0)	83.6 (1.3)
Obstructive nephropathy	622	92.7 (1.0)	91.1 (1.1)	88.6 (1.3)	85.6 (1.5)	83.5 (1.8)
Other	2,396	91.8 (0.5)	87.9 (0.6)	83.9 (0.7)	81.1 (0.8)	78.1 (1.0)
Unknown	2,559	94.3 (0.5)	91.1 (0.6)	87.9 (0.7)	84.2 (0.8)	80.3 (1.0)
Not reported	2,956	91.9 (0.5)	89.2 (0.6)	85.9 (0.7)	83.0 (0.8)	79.1 (1.0)
Transplant number						
First transplant	28,887	92.9 (0.2)	89.5 (0.2)	86.2 (0.2)	82.3 (0.3)	77.9 (0.3)
Subsequent transplants	4,801	92.0 (0.4)	88.7 (0.4)	83.8 (0.5)	80.0 (0.6)	75.3 (0.8)

NOTES: Numbers in parentheses represent the standard error of the estimate for each value. Rates based on fewer than 30 observations are not displayed. Survival rates for individual sex, race, and primary diagnosis groups were age-adjusted to the age distribution of all cadaver donor transplant recipients.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1993 update, 1987-91.

Table 39
Living-related donor transplant patient survival, by age, sex, race, and primary diagnosis: 1987-91

Age, sex, race, and primary diagnosis	Total	Percent surviving				
		1 year	2 years	3 years	4 years	5 years
All persons	8,987	96.8 (0.2)	94.9 (0.2)	93.2 (0.3)	91.0 (0.4)	88.9 (0.4)
Age						
Under 15 years	874	96.9 (0.6)	96.3 (0.7)	95.6 (0.7)	93.9 (0.9)	93.9 (0.9)
15-24 years	1,574	98.2 (0.3)	97.2 (0.4)	96.6 (0.5)	95.5 (0.6)	94.2 (0.8)
25-34 years	2,675	97.6 (0.3)	95.5 (0.4)	94.1 (0.5)	92.5 (0.6)	91.3 (0.7)
35-44 years	2,060	97.2 (0.4)	95.8 (0.5)	93.9 (0.6)	91.3 (0.8)	88.4 (1.0)
45-54 years	1,165	95.7 (0.6)	92.0 (0.8)	88.9 (1.0)	86.0 (1.2)	83.0 (1.5)
55-64 years	565	91.2 (1.2)	88.2 (1.4)	85.2 (1.6)	79.9 (2.1)	72.7 (2.8)
65-74 years	70	88.6 (3.8)	83.7 (4.5)	74.1 (6.0)	63.0 (7.8)	63.0 (7.8)
75 years or over	4	—	—	—	—	—
Sex						
Male	5,236	96.8 (0.3)	94.8 (0.3)	93.0 (0.4)	90.8 (0.5)	89.1 (0.6)
Female	3,751	96.9 (0.3)	95.0 (0.4)	93.5 (0.4)	91.3 (0.5)	88.6 (0.7)
Race						
Asian	142	97.7 (1.4)	96.0 (1.8)	95.3 (2.0)	95.3 (2.0)	95.3 (2.0)
Black	1,100	96.7 (0.5)	94.3 (0.7)	91.5 (0.9)	87.9 (1.2)	85.2 (1.5)
White	7,576	96.8 (0.2)	95.0 (0.3)	93.4 (0.3)	91.4 (0.4)	89.4 (0.5)
American Indian	113	99.5 (0.9)	98.3 (1.7)	96.8 (2.1)	94.7 (2.8)	88.6 (5.0)
Other/unknown	56	98.7 (1.8)	98.7 (1.8)	98.7 (1.8)	95.6 (4.0)	95.6 (4.0)
Primary diagnosis						
Diabetes	1,796	96.0 (0.5)	91.8 (0.7)	89.4 (0.8)	86.3 (1.0)	83.6 (1.2)
Glomerulonephritis	2,660	97.3 (0.3)	96.3 (0.4)	95.3 (0.4)	94.3 (0.5)	92.5 (0.7)
Hypertension	756	95.5 (0.7)	94.2 (0.9)	92.1 (1.2)	90.6 (1.4)	88.3 (1.7)
Polycystic kidney disease	400	98.9 (0.7)	97.8 (1.0)	95.9 (1.3)	95.2 (1.5)	93.0 (2.3)
Interstitial nephritis	434	97.9 (0.7)	97.6 (0.8)	96.5 (1.0)	93.8 (1.4)	91.4 (1.9)
Obstructive nephropathy	268	96.4 (1.2)	95.4 (1.3)	94.4 (1.4)	92.9 (1.9)	92.9 (1.1)
Other	1,019	98.4 (0.4)	96.8 (0.5)	94.9 (0.7)	91.6 (1.0)	89.6 (1.1)
Unknown	635	96.9 (0.7)	95.1 (0.9)	93.9 (1.0)	91.5 (1.3)	89.1 (1.6)
Not reported	1,019	97.0 (0.5)	94.9 (0.7)	93.8 (0.8)	92.0 (0.9)	89.9 (1.2)
Transplant number						
First transplant	8,373	96.9 (0.2)	95.1 (0.2)	93.5 (0.3)	91.2 (0.4)	89.1 (0.5)
Subsequent transplants	614	94.9 (0.8)	92.5 (1.0)	89.4 (1.3)	88.0 (1.4)	85.8 (1.7)

NOTES: Numbers in parentheses represent the standard error of the estimate for each value. Rates based on fewer than 30 observations are not displayed. Survival rates for individual sex, race, and primary diagnosis groups were age-adjusted to the age distribution of all living-related donor transplant recipients.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1993 update, 1987-91.

Table 40

Cadaver donor transplant graft survival of patients, by age, sex, race, and primary diagnosis: 1987-91

Age, sex, race, and primary diagnosis	Total	Percent surviving				
		1 year	2 years	3 years	4 years	5 years
All persons	33,688	78.9 (0.2)	72.6 (0.3)	66.7 (0.3)	61.6 (0.3)	56.6 (0.4)
Age						
Under 15 years	920	74.1 (1.4)	67.4 (1.6)	62.9 (1.7)	59.1 (1.8)	57.5 (1.9)
15-24 years	2,821	78.7 (0.8)	70.3 (0.9)	62.6 (1.0)	57.2 (1.1)	52.6 (1.2)
25-34 years	7,130	79.7 (0.5)	73.5 (0.5)	67.4 (0.6)	62.1 (0.7)	57.3 (0.8)
35-44 years	9,345	79.2 (0.4)	73.1 (0.5)	67.3 (0.5)	62.3 (0.6)	57.1 (0.7)
45-54 years	7,506	79.2 (0.5)	73.2 (0.5)	67.8 (0.6)	63.2 (0.6)	58.8 (0.7)
55-64 years	4,863	78.5 (0.6)	72.4 (0.7)	67.0 (0.7)	61.3 (0.8)	54.7 (1.0)
65-74 years	1,076	74.5 (1.3)	69.7 (1.4)	63.0 (1.6)	58.2 (1.8)	50.4 (2.2)
75 years or over	27	—	—	—	—	—
Sex						
Male	20,674	78.8 (0.3)	72.3 (0.3)	66.4 (0.4)	61.3 (0.4)	56.1 (0.5)
Female	13,014	78.9 (0.4)	73.2 (0.4)	67.4 (0.4)	62.4 (0.5)	57.5 (0.6)
Race						
Asian	866	82.6 (1.3)	76.9 (1.5)	72.9 (1.6)	67.7 (1.8)	60.1 (2.2)
Black	7,616	76.0 (0.5)	66.2 (0.6)	58.1 (0.6)	51.6 (0.7)	45.2 (0.8)
White	24,636	79.5 (0.3)	74.4 (0.3)	69.1 (0.3)	64.4 (0.4)	59.8 (0.4)
American Indian	359	78.1 (2.2)	72.3 (2.4)	67.5 (2.7)	65.2 (2.8)	61.6 (3.2)
Other/unknown	211	88.8 (2.2)	85.0 (2.6)	80.8 (2.9)	80.1 (3.0)	80.1 (3.5)
Primary diagnosis						
Diabetes	7,112	77.9 (0.5)	71.6 (0.5)	65.5 (0.6)	59.6 (0.7)	53.4 (0.8)
Glomerulonephritis	8,745	79.1 (0.4)	73.6 (0.5)	67.9 (0.5)	63.0 (0.6)	57.9 (0.7)
Hypertension	5,082	77.9 (0.6)	68.5 (0.7)	60.2 (0.7)	53.5 (0.8)	46.8 (1.0)
Polycystic kidney disease	2,851	80.3 (0.8)	76.6 (0.8)	73.0 (0.9)	69.2 (1.0)	64.9 (1.1)
Interstitial nephritis	1,365	81.2 (1.1)	75.3 (1.2)	70.8 (1.3)	66.0 (1.5)	62.9 (1.6)
Obstructive nephropathy	622	80.2 (1.6)	75.9 (1.8)	71.6 (1.9)	67.8 (2.1)	64.6 (2.4)
Other	2,396	77.6 (0.9)	71.4 (0.9)	65.8 (1.0)	62.0 (1.1)	57.6 (1.3)
Unknown	2,559	79.0 (0.8)	70.8 (0.9)	63.1 (1.0)	57.8 (1.1)	53.6 (1.3)
Not reported	2,956	80.0 (0.7)	74.8 (0.8)	70.3 (0.9)	67.8 (0.9)	64.3 (1.1)
Transplant number						
First transplant	28,887	79.8 (0.2)	73.5 (0.3)	67.6 (0.3)	62.7 (0.3)	57.5 (0.4)
Subsequent transplants	4,801	73.0 (0.6)	67.0 (0.7)	60.7 (0.8)	54.9 (0.8)	50.8 (0.9)

NOTES: Numbers in parentheses represent the standard error of the estimate for each value. Rates based on fewer than 30 observations are not displayed. Survival rates for individual sex, race, and primary diagnosis groups were age-adjusted to the age distribution of all cadaver donor transplant recipients.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1993 update, 1987-91.

Table 41
Living-related donor transplant graft survival of patients, by age,
sex, race, and primary diagnosis: 1987-91

Age, sex, race, and primary diagnosis	Total	Percent surviving				
		1 year	2 years	3 years	4 years	5 years
All persons	8,987	90.0 (0.3)	86.2 (0.4)	82.6 (0.4)	78.9 (0.5)	75.3 (0.6)
Age						
Under 15 years	874	87.9 (1.1)	84.7 (1.2)	81.4 (1.4)	75.9 (1.7)	74.1 (1.8)
15 - 24 years	1,574	91.3 (0.7)	86.6 (0.9)	81.4 (1.1)	76.8 (1.2)	73.5 (1.4)
25 - 34 years	2,675	90.8 (0.6)	86.5 (0.7)	83.6 (0.8)	80.5 (0.9)	76.3 (1.1)
35 - 44 years	2,060	90.9 (0.6)	88.4 (0.7)	85.0 (0.8)	81.7 (1.0)	78.7 (1.2)
45 - 54 years	1,165	89.0 (0.9)	85.2 (1.1)	81.4 (1.2)	78.2 (1.4)	74.9 (1.7)
55 - 64 years	565	85.8 (1.5)	82.2 (1.6)	78.7 (1.8)	74.6 (2.2)	67.2 (2.9)
65 - 74 years	70	80.0 (4.8)	71.9 (5.5)	67.0 (6.1)	59.2 (7.5)	59.2 (7.5)
75 years or over	4	—	—	—	—	—
Sex						
Male	5,236	89.7 (0.4)	86.0 (0.5)	82.4 (0.6)	78.5 (0.7)	75.2 (0.8)
Female	3,751	90.4 (0.5)	86.5 (0.6)	82.8 (0.7)	79.4 (0.8)	75.3 (0.9)
Race						
Asian	142	93.2 (2.2)	90.1 (2.7)	89.3 (2.8)	87.8 (3.1)	84.8 (4.1)
Black	1,100	86.4 (1.0)	79.6 (1.2)	74.0 (1.4)	66.6 (1.7)	60.2 (2.1)
White	7,576	90.4 (0.3)	87.1 (0.4)	83.7 (0.4)	80.5 (0.5)	77.3 (0.6)
American Indian	113	96.0 (1.7)	90.7 (2.9)	87.2 (3.6)	81.6 (4.6)	76.4 (6.2)
Other/unknown	56	88.5 (4.4)	86.8 (4.7)	82.1 (5.6)	75.5 (7.0)	69.5 (8.6)
Primary diagnosis						
Diabetes	1,796	88.9 (0.8)	84.0 (0.9)	80.7 (1.0)	76.9 (1.2)	73.1 (1.4)
Glomerulonephritis	2,660	90.2 (0.6)	87.1 (0.7)	83.7 (0.8)	80.2 (0.9)	76.9 (1.1)
Hypertension	756	88.5 (1.2)	83.2 (1.4)	76.3 (1.7)	67.2 (2.0)	63.6 (2.4)
Polycystic kidney disease	400	92.8 (1.3)	89.7 (1.6)	85.5 (2.0)	81.9 (2.2)	80.8 (2.6)
Interstitial nephritis	434	88.7 (1.5)	86.3 (1.7)	82.7 (1.9)	79.7 (2.2)	75.9 (2.7)
Obstructive nephropathy	268	93.2 (1.6)	91.0 (1.8)	90.7 (1.9)	85.5 (2.8)	84.0 (3.2)
Other	1,019	90.5 (0.9)	86.6 (1.1)	83.2 (1.3)	79.5 (1.5)	76.8 (1.7)
Unknown	635	89.9 (1.2)	84.9 (1.5)	81.9 (1.6)	77.4 (1.9)	72.0 (2.4)
Not reported	1,019	93.1 (0.8)	90.4 (0.9)	88.4 (1.0)	86.3 (1.2)	83.5 (1.5)
Transplant number						
First transplant	8,373	90.3 (0.3)	86.5 (0.4)	83.0 (0.4)	79.2 (0.5)	75.7 (0.6)
Subsequent transplants	614	84.5 (1.4)	80.8 (1.6)	75.3 (1.8)	72.2 (2.0)	67.5 (2.5)

NOTES: Numbers in parentheses represent the standard error of the estimate for each value. Rates based on fewer than 30 observations are not displayed. Survival rates for individual sex, race, and primary diagnosis groups were age-adjusted to the age distribution of all living-related donor transplant recipients.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, April 1993 update, 1987-91.

Hospital inpatient utilization

Data

This section presents information about the number of hospital stays, time spent in inpatient status, and average length of stays for Medicare ESRD beneficiaries. Medicare expenditures for inpatient services are presented in the next section, along with expenditures for other services.

The number and duration of hospitalizations billed to HCFA on behalf of Medicare ESRD beneficiaries are shown in Tables 42 through 47. The hospitalization data come from the Medicare Automated Data Retrieval System (MADRS) which contains selected expenditure and medical information for each hospitalization. These hospitalization records were linked with personal identification records from the ESRD Program Management and Medical Information System (PMMIS). The number of hospital discharges and the total number of days hospitalized per year were calculated for each beneficiary.

The analysis was performed for calendar years 1986 through 1991 and includes all people who were alive, Medicare entitled, and ESRD at any time during the observation year. For each calendar year, patients were classified into one of four mutually exclusive treatment groups: (1) patients on dialysis for the entire calendar year (or that part of the year they were alive, Medicare entitled, and ESRD); (2) patients who received a kidney transplant during the year; (3) patients who had a functioning graft the entire part of the year they were alive and entitled; and (4) patients who experienced a graft failure, but did not have a transplantation during that same calendar year.

A qualification on these utilization data concerns the provisions of Medicare as a secondary payer. Beginning in 1981, Medicare became the secondary payer for care for ESRD patients in their first year of Medicare coverage if they have another insurance carrier and if they are entitled to Medicare solely because of ESRD (i.e., not because of disability and not because they are 65 years of age or over). In 1990, this was extended to 18 months¹. The extent of coverage of, and payment for, services by other payers is not well known because Medicare may not receive copies of bills for these services.

Table 42 includes Medicare secondary payer (MSP) beneficiaries since the purpose is to show total Medicare covered hospitalizations.

However, the per patient data in Tables 43 to 48 exclude Medicare secondary payer beneficiaries, and all persons who were potentially Medicare secondary payer beneficiaries, so that these tables will have the best estimates of actual ESRD hospitalization rates. In order to reduce biases due to MSP, persons under 65 years of age must have had ESRD for at least one year prior to January 1 of the observation year to be included in these tables.

¹In 1993, the MSP provisions were amended to include beneficiaries with ESRD and entitled to Medicare based on age and disability. However, for the years of data displayed in this section, and in the Program Expenditures portion of this report, MSP provisions apply to those beneficiaries entitled solely based on ESRD

Results

Table 42 shows the total Medicare covered hospitalization experience of the Medicare ESRD population from 1986 through 1991. The number of Medicare covered hospitalizations increased from 199,800 in 1986 to 312,800 in 1991, an average annual increase of 9.4 percent. During this same time, the total number of inpatient days increased from 1,851,300 to 3,118,800, an average annual increase of 11.0 percent. The higher rate of increase in hospitalized days (11.0 percent) compared to hospitalizations (9.4 percent) was due to an increase in average length of stay, from 9.3 days in 1986 to 10.0 days in 1991. In 1991, dialysis patients accounted for 84.5 percent of all hospitalizations among ESRD beneficiaries (264,400). Transplant recipients and functioning graft patients together accounted for 13.7 percent of hospitalizations (20,300 and 22,500, respectively) while graft failure patients accounted for 1.8 percent of hospitalizations (5,600).

Table 43 shows hospitalization rates (discharges per person and hospital days per person) by patient treatment group. Excluded from Table 43 are persons for whom Medicare was the secondary payer as well as persons for whom Medicare may have been the secondary payer. Overall, hospitalization rates remained fairly constant over this 6 year period at about 1.5 to 1.6 hospitalizations per person. The average number of hospitalized days per person increased from 14.8 in 1986 to 16.2 in 1990 and decreasing slightly to 15.9 in 1991. Dialysis patients spent an average of 18.0 days in the hospital in 1991, greater than the 1986 rate of 15.5 days. The average length of stay for dialysis patients increased from 9.3 days in 1986 to 10.3 days in 1991. Transplant recipients were hospitalized an average of 2.7 times in 1991, down slightly from 2.8 in 1986. However, total days spent in the hospital declined by 5.2 days for transplant recipients, from 33.6 days to 28.4 days in 1986 and 1991, respectively. Persons with a functioning kidney graft had the lowest overall hospitalization rates. In 1991 they were hospitalized an average of 0.6 times per person, down slightly from 0.8 times in 1986, and representing an average annual decrease of 3.5 percent. The total hospitalized days per functioning graft patient also declined, from 6.5 days in 1986 to 5.5 days in 1991. Those persons whose grafts failed experienced the highest hospitalization rates. In each of the years shown, these persons averaged about 3 hospitalizations per person. The average length of stay remained constant from 1986 through 1991 (9.3 and 9.1 days respectively). Consequently, the total hospitalized days also remained relatively constant from 1986 to 1991 (28.1 and 27.5 days, respectively).

Per capita discharges and inpatient days during 1991 by age, sex, race, and primary diagnosis for renal failure are shown in Tables 44 through 47. There is a separate table for each of the four treatment groups: dialysis, transplant, functioning graft, and graft failure. To examine utilization, it is necessary to adjust for varying lengths of

entitlement periods for patients during the year. That is, the data should be annualized for patients who become ESRD during the year and those who die during the year, because their records would not reflect a full year's utilization. For this reason, Tables 44 through 47 display both unadjusted and annualized data for the average number of days during the year that people in each group were ESRD and Medicare entitled. The annualized values are estimated by a linear extrapolation of the basic per capita figures to a full year (365 days) of coverage. Annualization is most important for the age groups and primary diagnosis classifications since, in general, older people and persons with diabetes have the fewest numbers of days at risk. Unless otherwise stated, and except for average lengths of stay, all results are based on annualized values.

Inpatient utilization for dialysis patients during 1991 is shown in Table 44. The number of days hospitalized and the average length of stay during the year increased with age. For example, average length of stay increased from 6.8 days per stay for patients under 15 years of age group to 11.7 for those over 75 years of age. On an annualized basis, persons over 75 years of age had almost three times as many hospital days (30.8 days) as did persons under 15 years of age (11.9 days). On average, women were hospitalized slightly more often than were men (2.3 and 2.1 discharges, respectively). Women also experienced 3.8 more inpatient days per year per person than did men (24.4 and 20.6, respectively). The lowest hospitalization rates were experienced by Asians (1.4 discharges per person) and the highest by American Indians and white persons at 2.3 discharges per person. Black, white, and American Indian beneficiaries averaged between 20 and 24 hospital days per person in 1991. Asians had about one-third fewer hospital days at 14.5. Patients whose renal failure was attributed to diabetes experienced the highest annualized average hospitalization rate for the year at 2.7 discharges per person. The lowest average number of hospitalizations was for those persons with polycystic kidney disease at 1.5 discharges. These two groups also experienced the highest number of hospital days per patient for the year (30.8 days for diabetes) and the lowest (14.0 days for polycystic kidney disease).

Table 45 shows hospitalization rates by demographic group for transplant recipients. There was less age effect on hospitalization rates among transplant recipients than among dialysis patients (see Table 44). Patients under 15 years of age had the highest number of discharges per patient (3.7 discharges) and the highest number of days per patient (34.0 days). There were no major differences in utilization between males and females. Black and white beneficiaries were hospitalized more often (2.6 and 2.8 discharges, respectively) and for more days per year (about 29.5 days) than other racial groups. Asian persons had the lowest utilization in these categories with 2.3 discharges and 24.1 hospital days. The average length of stay ranged from a low of 10.3 days for American Indians to a high of 11.3 for black persons. Patients whose primary diagnosis was diabetes had more inpatient days (36.0 days), and were hospitalized more often (3.3 discharges), than any other diagnosis group. Patients with interstitial nephritis

and obstructive nephropathy had the shortest average length of stay (10.1 and 10.2 days, respectively) while diabetics and those whose renal failure was attributed to hypertension had the longest average length of stay (10.9 and 11.0 days, respectively).

Functioning graft patients, as shown in Table 46, had the lowest use of inpatient services with 0.7 discharges (less than 1 per person per year), 5.7 total inpatient days, and an average length of stay of 8.5. Days of hospitalization increased with age, from 3.5 for those patients 15 to 24 years of age to 8.2 for those 65 to 74 years of age. This trend was due predominantly to longer average lengths of stay which ranged from 6.3 days for those 15 to 24 years of age to 10.1 for those 65 to 74 years of age. Males and females showed only minor differences in the various categories of utilization. American Indians and black persons were hospitalized for more total days (7.8 and 7.1 days, respectively) than were Asian persons (3.3 days) or white persons (5.5 days). Those patients whose primary diagnosis was diabetes experienced twice as many days per patient for the year (11.0 days) as the other diagnostic groups which ranged from 3.9 days for those with obstructive nephropathy to 5.7 days for those whose renal failure was attributed to hypertension.

Inpatient utilization for graft failure patients is shown in Table 47. Patients experiencing a graft failure had the highest number of hospitalizations (3.4 discharges per person) of any treatment group. Persons in the 25 to 34 years of age and 55 to 64 years of age categories had the most discharges (3.5) in this treatment category. Utilization increased with age from 23.3 days for those 15 to 24 years of age to 37.8 days for those 55 to 64 years of age. Females experienced about 6 more total days of hospitalization per person for the year than did males (34.6 and 28.2, respectively) due to a combination of longer lengths of stay and more frequent hospitalizations. Discharge rates were highest for white persons (3.5 per person) and lowest for Asians (2.6 per person). Asians and white persons were hospitalized almost 5 more days than were black persons (32.4 and 27.5 inpatient days, respectively). Patients with diabetes as their primary diagnosis had 4.5 hospitalizations per year which averaged 10.5 days each. Consequently, this group also experienced the most total hospital days per person for the year (46.9). Total hospital days for the other diagnostic groups ranged from 25.4 days for those with glomerulonephritis to 32.3 for those whose renal failure was attributed to polycystic kidney disease.

Table 48 presents diagnostic-specific hospitalization rates for the 1991 Medicare dialysis population. The information in this table is based on the same data as shown in Table 44. For example, the annualized hospitalization rate for all dialysis patients shown in Table 44 is 2.2 discharges per person. Because more detail is shown in Table 48, the rates are expressed in annualized discharges per 100 persons. So the 217 discharges per 100 persons in Table 48 is the same as the 2.2 discharges per person shown in Table 44.

Hospitalizations were categorized according to the principal diagnosis listed on the hospitalization bill files. Diagnoses are coded using the International Classification

of Diseases, (Ninth Revision) with Clinical Modification (ICD-9-CM). For the most part, hospitalizations were categorized according to broad ICD-9-CM categories, such as Diseases of the Circulatory System, encompassing codes 390 through 459. An exception was made for diagnoses specifically related to complications of vascular access. This category was based on three specific codes as listed below:

Category	Codes
Complications of Vascular Access	996.1, 996.62, 996.73
Diseases of the Circulatory System	390-459
Diseases of the Digestive System	520-579
Diseases of the Genitourinary System	580-629
Endocrine, Nutritional, and Metabolic Diseases, and Immunity Disorders	240-279
Diseases of the Respiratory System	460-519
Infectious and Parasitic Diseases	001-139
Symptoms, Signs, Ill defined Conditions	780-799
All Other	All Other Codes

The most common cause of hospitalization were circulatory diseases accounting for over one-fourth of all hospitalizations (56 per 100 persons). This was followed by vascular complications (39 per 100 persons)², digestive system diseases (20 per 100 persons), and endocrine, nutritional, and metabolic diseases (19 per 100 persons).

Circulatory disease hospitalizations increased with age, rising from 19 discharges per 100 persons for persons under age 15 to 76 discharges per 100 persons for persons over age 75. There was a notable difference in circulatory disease hospitalization by race as well, ranging from a low

of 37 per 100 persons among Asians to a high of 61 per 100 persons for white beneficiaries. Relatively high rates of circulatory hospitalization occurred for persons whose renal failure was attributed to hypertension and diabetes (70 and 65 discharges per 100 persons, respectively) while relatively low rates occurred for persons whose renal failure was attributed to polycystic kidney disease and obstructive nephropathy (36 and 37 discharges per 100 persons, respectively). Much of the difference in circulatory hospitalization by cause of renal failure and race is probably due to the age difference in these groups.

Hospitalization rates for vascular access complications did not vary greatly by age except for increased rates for persons over the age of 65. Females had higher rates than did males. Higher rates were observed for black persons and American Indians (45 and 43 per 100, respectively) than for Asians and white persons (29 and 36 per 100, respectively). Among diagnostic groups, the highest rate was for persons whose renal failure was attributed to diabetes (47 per 100 persons) while the lowest rates were for persons whose renal failure was attributed to glomerulonephritis (33 per 100 persons) and polycystic kidney disease (28 per 100 persons).

Hospitalizations for endocrine, nutritional and metabolic diseases and immunity disorders were largely due to diabetes and related complications. Consequently, persons whose renal failure was attributed to diabetes had a hospitalization rate for this category which was roughly four times as great as for other causes of renal failure. Similarly, groups with a higher percent of diabetic patients, such as females and American Indians had higher hospitalization rates in this category.

²This category does not represent all the vascular access procedures that are performed for dialysis patients. Some vascular access revisions and repairs are done on an outpatient basis. In addition, some procedures which are done in the inpatient setting are associated with a different principal diagnosis. Finally, the diagnosis of vascular access complication does not necessarily imply that a procedure was performed.

Table 42
Medicare end stage renal disease program inpatient hospital utilization,
by patient treatment group: 1986-91

	1986	1987	1988	1989	1990	1991	Average annual percent change
Total							
Number of patients	136,957	148,771	165,894	181,189	198,273	217,771	9.7
Discharges in thousands	199.8	212.8	234.6	258.1	284.6	312.8	9.4
Days in thousands	1,851.3	1,995.2	2,290.1	2,637.0	2,902.1	3,118.8	11.0
Average length of stay	9.3	9.4	9.8	10.2	10.2	10.0	1.5
Dialysis							
Number of patients	109,060	116,858	130,888	143,446	156,853	172,375	9.6
Discharges in thousands	162.3	172.4	193.5	215.1	238.1	264.4	10.3
Days in thousands	1,470.4	1,594.2	1,884.5	2,216.0	2,449.2	2,669.7	12.7
Average length of stay	9.1	9.2	9.7	10.3	10.3	10.1	2.2
Transplant							
Number of patients	8,274	8,235	8,079	8,093	8,895	9,210	2.2
Discharges in thousands	19.5	19.3	18.5	18.5	20.6	20.3	0.8
Days in thousands	227.5	222.7	209.7	206.2	223.9	208.1	-1.8
Average length of stay	11.7	11.5	11.3	11.1	10.9	10.3	-2.5
Functioning graft							
Number of patients	18,408	22,181	25,305	27,788	30,636	34,253	13.2
Discharges in thousands	14.4	16.6	17.8	19.0	20.7	22.5	9.4
Days in thousands	120.7	138.6	152.1	163.1	179.6	190.0	9.5
Average length of stay	8.4	8.3	8.6	8.6	8.7	8.4	0.1
Graft failure							
Number of patients	1,215	1,497	1,622	1,862	1,889	1,933	9.7
Discharges in thousands	3.6	4.5	4.9	5.5	5.2	5.6	9.1
Days in thousands	32.7	39.6	43.9	51.7	49.3	51.0	9.3
Average length of stay	9.1	8.8	9.0	9.3	9.5	9.2	0.2

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, April 1993 update, 1986-91.

Table 43
Medicare end stage renal disease program inpatient hospital utilization,
by patient treatment group, excluding Medicare secondary payer patients: 1986-91

	1986	1987	1988	1989	1990	1991	Average annual percent change
Total							
Number of patients	99,769	108,474	120,416	132,714	145,636	160,767	10.0
Discharges per patient	1.6	1.5	1.5	1.5	1.6	1.6	-0.1
Days per patient	14.8	14.7	15.2	16.1	16.2	15.9	1.5
Average length of stay	9.4	9.6	10.0	10.5	10.4	10.2	1.6
Dialysis							
Number of patients	78,228	83,751	92,583	101,799	111,411	122,811	9.4
Discharges per patient	1.7	1.7	1.7	1.7	1.7	1.7	0.9
Days per patient	15.5	15.7	16.7	18.0	18.1	18.0	3.1
Average length of stay	9.3	9.5	10.1	10.6	10.6	10.3	2.1
Transplant							
Number of patients	3,876	3,729	3,766	3,767	4,350	4,645	3.7
Discharges per patient	2.8	2.8	2.7	2.7	2.7	2.7	-0.8
Days per patient	33.6	33.0	32.1	30.9	30.4	28.4	-3.3
Average length of stay	12.2	11.9	11.8	11.5	11.2	10.7	-2.5
Functioning graft							
Number of patients	16,627	19,721	22,719	25,522	28,258	31,620	13.7
Discharges per patient	0.8	0.7	0.7	0.7	0.7	0.6	-3.5
Days per patient	6.5	6.1	5.8	5.8	5.7	5.5	-3.5
Average length of stay	8.5	8.4	8.6	8.6	8.7	8.5	0.1
Graft failure							
Number of patients	1,038	1,273	1,348	1,626	1,617	1,691	10.3
Discharges per patient	3.0	3.1	3.1	3.0	2.8	3.0	-0.1
Days per patient	28.1	27.2	28.1	27.9	27.0	27.5	-0.4
Average length of stay	9.3	8.8	9.1	9.2	9.5	9.1	-0.3

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, April 1993 update, 1986-91.

Table 44**Medicare end stage renal disease program Inpatient utilization for dialysis patients, by age, sex, race, and primary diagnosis, excluding Medicare secondary payer patients: 1991**

Age, sex, race, and primary diagnosis	Number of patients	Number of days	Discharges per patient	Days per patient	Average length of stay	Annualized discharge per patient	Annualized days per patient
Total	122,811	293	1.7	18.0	10.3	2.2	22.5
Age							
Under 15 years	305	347	1.6	11.3	6.8	1.7	11.9
15-24 years	1,734	353	1.7	12.7	7.5	1.7	13.2
25-34 years	6,242	346	1.7	13.6	7.9	1.8	14.4
35-44 years	10,867	339	1.6	14.0	8.7	1.7	15.1
45-54 years	13,483	332	1.7	15.1	9.1	1.8	16.7
55-64 years	20,794	313	1.7	16.6	9.9	2.0	19.4
65-74 years	42,745	273	1.8	19.3	10.9	2.4	25.9
75 years or over	26,641	256	1.8	21.5	11.7	2.6	30.8
Sex							
Male	61,742	292	1.6	16.5	10.0	2.1	20.6
Female	61,069	294	1.8	19.6	10.7	2.3	24.4
Race							
Asian	2,201	301	1.2	12.0	10.2	1.4	14.5
Black	41,047	311	1.7	17.3	10.1	2.0	20.4
White	76,380	283	1.8	18.7	10.5	2.3	24.1
American Indian	1,355	303	1.9	17.5	9.1	2.3	21.2
Other/unknown	1,828	319	1.4	13.4	9.3	1.7	15.3
Primary diagnosis							
Diabetes	33,038	275	2.0	23.1	11.3	2.7	30.8
Glomerulonephritis	17,135	317	1.6	14.3	9.1	1.8	16.5
Hypertension	37,243	283	1.7	17.7	10.2	2.2	22.9
Polycystic kidney disease	4,434	326	1.4	12.4	9.0	1.5	14.0
Interstitial nephritis	4,432	303	1.7	16.4	9.9	2.0	19.8
Obstructive nephropathy	3,216	300	1.5	16.1	10.7	1.8	19.7
Other	6,309	292	1.8	18.5	10.2	2.3	23.1
Unknown	8,493	301	1.6	16.3	10.1	2.0	19.8
Not reported	8,511	333	1.4	12.9	9.5	1.5	14.2

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, April 1993 update, 1991.

Table 45

Medicare end stage renal disease program inpatient utilization for transplant patients, by age, sex, race, and primary diagnosis, excluding Medicare secondary payer patients: 1991

Age, sex, race and primary diagnosis	Number of patients	Number of days	Discharges per patient	Days per patient	Average length of stay	Annualized discharge per patient	Annualized days per patient
Total	4,645	355	2.7	28.4	10.7	2.7	29.3
Age							
Under 15 years	103	355	3.6	33.0	9.1	3.7	34.0
15-24 years	378	361	2.5	24.1	9.7	2.5	24.4
25-34 years	957	360	2.7	26.8	10.1	2.7	27.3
35-44 years	1,193	356	2.7	28.5	10.6	2.8	29.3
45-54 years	991	355	2.6	30.1	11.4	2.7	31.0
55-64 years	728	352	2.6	30.2	11.5	2.7	31.4
65-74 years	289	332	2.6	27.0	10.5	2.8	29.7
75 years or over	6	—	—	—	—	—	—
Sex							
Male	2,755	354	2.6	28.3	10.9	2.7	29.3
Female	1,890	355	2.7	28.5	10.5	2.8	29.4
Race							
Asian	133	357	2.2	23.5	10.5	2.3	24.1
Black	1,259	357	2.6	28.9	11.3	2.6	29.6
White	3,165	354	2.7	28.5	10.5	2.8	29.5
American Indian	53	355	2.4	25.0	10.3	2.5	25.8
Other/unknown	35	362	2.5	24.8	10.1	2.5	25.0
Primary diagnosis							
Diabetes	868	351	3.2	34.6	10.9	3.3	36.0
Glomerulonephritis	1,284	359	2.4	26.1	10.7	2.5	26.6
Hypertension	757	356	2.5	27.6	11.0	2.6	28.4
Polycystic kidney disease	323	356	2.6	28.4	10.8	2.7	29.2
Interstitial nephritis	177	357	2.6	26.0	10.1	2.6	26.7
Obstructive nephropathy	99	361	2.7	27.8	10.2	2.8	28.2
Other	350	353	2.9	27.9	9.5	3.0	28.9
Unknown	369	358	2.4	25.6	10.5	2.5	26.2
Not reported	418	343	2.5	27.9	11.0	2.7	29.7

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, April 1993 update, 1991.

Table 46

Medicare end stage renal disease program inpatient utilization for functioning graft patients, by age, sex, race, and primary diagnosis, excluding Medicare secondary payer patients: 1991

Age, sex, race, and primary diagnosis	Number of patients	Number of days	Discharges per patient	Days per patient	Average length of stay	Annualized discharge per patient	Annualized days per patient
Total	31,620	351	0.6	5.5	8.5	0.7	5.7
Age							
Under 15 years	724	342	0.7	4.2	6.5	0.7	4.5
15-24 years	1,963	351	0.5	3.3	6.3	0.6	3.5
25-34 years	6,178	354	0.6	4.7	7.5	0.7	4.9
35-44 years	9,015	352	0.6	5.1	8.4	0.6	5.3
45-54 years	7,013	350	0.7	6.0	9.1	0.7	6.2
55-64 years	4,943	347	0.7	6.5	9.3	0.7	6.9
65-74 years	1,692	352	0.8	7.8	10.1	0.8	8.2
75 years or over	92	352	0.8	6.3	7.8	0.8	6.6
Sex							
Male	19,328	350	0.6	5.3	8.7	0.6	5.6
Female	12,292	352	0.7	5.7	8.2	0.7	5.9
Race							
Asian	706	353	0.4	3.2	7.9	0.4	3.3
Black	5,512	353	0.8	6.9	8.9	0.8	7.1
White	24,770	350	0.6	5.2	8.4	0.6	5.5
American Indian	318	353	0.9	7.6	8.6	0.9	7.8
Other/unknown	314	358	0.4	2.7	6.8	0.4	2.8
Primary diagnosis							
Diabetes	6,015	349	1.1	10.5	9.6	1.1	11.0
Glomerulonephritis	8,580	352	0.5	3.5	7.5	0.5	3.7
Hypertension	3,853	353	0.7	5.5	8.3	0.7	5.7
Polycystic kidney disease	2,337	350	0.5	4.2	8.0	0.6	4.4
Interstitial nephritis	1,372	352	0.6	4.7	8.4	0.6	4.9
Obstructive nephropathy	839	354	0.5	3.8	7.7	0.5	3.9
Other	2,216	349	0.6	4.1	7.1	0.6	4.3
Unknown	2,363	351	0.5	4.3	8.4	0.5	4.5
Not reported	4,045	349	0.5	4.8	8.8	0.6	5.0

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, April 1993 update, 1991.

Table 47

Medicare end stage renal disease program inpatient utilization for graft failure patients, by age, sex, race, and primary diagnosis, excluding Medicare secondary payer patients: 1991

Age, sex, race, and primary diagnosis	Number of patients	Number of days	Discharges per patient	Days per patient	Average length of stay	Annualized discharge per patient	Annualized days per patient
Total	1,691	329	3.0	27.5	9.1	3.4	30.6
Age							
Under 15 years	28	—	—	—	—	—	—
15-24 years	180	335	3.0	21.4	7.2	3.3	23.3
25-34 years	385	330	3.1	27.7	8.8	3.5	30.7
35-44 years	473	333	3.0	27.0	9.1	3.3	29.7
45-54 years	361	327	2.9	28.3	9.7	3.3	31.7
55-64 years	213	318	3.1	32.8	10.7	3.5	37.8
65-74 years	49	305	2.8	25.8	9.4	3.3	31.0
75 years or over	2	—	—	—	—	—	—
Sex							
Male	1,027	329	2.8	25.3	9.0	3.1	28.2
Female	664	327	3.3	30.9	9.3	3.7	34.6
Race							
Asian	34	315	2.2	27.9	12.6	2.6	32.4
Black	545	342	2.9	25.7	8.9	3.1	27.5
White	1,080	322	3.1	28.5	9.2	3.5	32.4
American Indian	21	—	—	—	—	—	—
Other/unknown	11	—	—	—	—	—	—
Primary diagnosis							
Diabetes	288	320	3.9	41.0	10.5	4.5	46.9
Glomerulonephritis	460	327	2.6	22.7	8.8	2.9	25.4
Hypertension	373	332	2.9	24.8	8.6	3.2	27.4
Polycystic kidney disease	91	323	2.6	28.5	11.1	2.9	32.3
Interstitial nephritis	69	336	3.3	25.5	7.8	3.6	27.8
Obstructive nephropathy	31	325	2.8	23.8	8.4	3.2	26.8
Other	146	341	3.0	24.0	8.0	3.2	25.7
Unknown	136	325	2.8	24.6	8.9	3.1	27.7
Not reported	97	336	3.5	32.1	9.2	3.8	35.0

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, April 1993 update, 1991.

Table 48

**Medicare end stage renal disease inpatient utilization, by principal diagnosis
of hospitalization by age, sex, race, and primary diagnosis
for dialysis patients, excluding Medicare secondary payer patients: 1991**

Age, sex, race and primary diagnosis	Number of patients	Principal diagnosis of hospitalization								
		All causes	Vascular access	Circulator diseases	Digestive diseases	Genitourin diseases	Endocrin/ metabolic	Respiratory diseases	Infectious diseases	All other
Hospitalizations per 100 persons (annualized)										
Total	122,811	217	39	56	20	17	19	14	9	44
Age										
Under 15 years	305	173	33	19	23	27	7	10	9	45
15-24 years	1,734	174	35	31	19	16	15	9	7	42
25-34 years	6,242	182	36	26	19	14	24	10	9	44
35-44 years	10,867	173	34	30	19	11	21	10	8	40
45-54 years	13,483	183	35	39	21	10	19	11	7	40
55-64 years	20,794	196	36	49	21	11	19	13	8	40
65-74 years	42,745	237	41	69	20	19	19	15	9	45
75 years or over	26,641	262	46	76	21	27	15	18	11	49
Sex										
Male	61,742	206	35	55	20	17	17	14	8	41
Female	61,069	228	43	57	21	18	21	13	9	45
Race										
Asian	2,201	142	29	37	12	11	12	11	6	24
Black	41,047	202	45	48	20	12	17	11	9	41
White	76,380	228	36	61	21	20	20	15	9	46
American Indian	1,355	232	43	46	16	19	30	17	11	50
Other/Unknown	1,828	165	31	38	15	11	14	12	7	36
Primary diagnosis										
Diabetes	33,038	271	47	65	22	18	43	14	11	53
Glomerulonephritis	17,135	180	33	44	20	16	9	13	7	38
Hypertension	37,243	223	40	70	21	17	12	15	8	40
Polycystic kidney disease	4,434	155	28	36	19	14	7	9	7	34
Interstitial nephritis	4,432	200	40	42	22	22	10	14	8	41
Obstructive nephropathy	3,216	183	40	37	16	26	8	10	8	39
Other	6,309	225	38	44	23	23	11	16	12	59
Unknown	8,493	196	37	47	19	18	10	14	8	42
Not reported	8,511	150	28	34	16	10	12	10	6	35

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, April 1993 update, 1991.

Program expenditures

Data

Expenditures for this section were obtained from the Medicare Automated Data Retrieval System (MADRS) at HCFA. MADRS is a system for linking Part A and Part B expenditure records by beneficiary for each calendar year. Records for ESRD beneficiaries in the ESRD Program Management and Medical Information System (PMMIS) were linked with MADRS for this analysis. At the time of this data report, complete data were available for the years 1986 through 1991.

Program expenditures include Medicare payments for all medical services for which Medicare beneficiaries are eligible. These services include inpatient hospital care, outpatient services (mostly dialysis), physician services, skilled nursing care, and home health care. Dialysis services, for the most part, are paid for under the composite rate methodology, which was approximately \$127 per dialysis session for 1984 to 1987 and \$125 for 1988 through 1991. Because outpatient dialysis is a Part B service, Medicare pays 80 percent of the composite rate with the beneficiary or other third party payer responsible for the remaining 20 percent. Patients who dialyze at home may select one of two methods for reimbursement of the cost of dialysis services. Under the Method I option, home dialysis supplies are obtained through the patient's dialysis facility which, in turn, bills the Medicare intermediary at the same composite rate as they bill for in-center dialysis. Dialysis expenditures for these patients appear in the outpatient category. Under Method II, the beneficiary obtains dialysis supplies directly from the supplier and then bills the Medicare carrier directly for those dialysis supplies. Dialysis expenditures for these persons appear in the physician/supplier category. In 1991, there were about 25,000 patients who dialyzed at home. Approximately 16,000 of these beneficiaries selected Method I for reimbursement and approximately 9,000 selected Method II. Payments for physician care, which is deemed to be part of the routine care of dialysis patients, is based on a capitation rate methodology system. From 1984 to 1986, the average amount for this physician care was \$188 per month; since 1986, the average rate has been \$173 per month. In addition, this section includes Medicare covered physician expenditures for all nondialysis related care. Payment for hospital care is based on the prospective payment system, under which Medicare pays a predetermined amount per hospital stay, depending on the diagnosis and/or procedure associated with the stay. For each hospital episode, lasting until there is a 90-day break between stays, the patient is responsible for a deductible. This deductible is roughly equivalent to 1 day of a hospital stay. This amount was \$400 in 1984; by 1991 it had risen to \$628.

Much of the Part B data in MADRS is aggregated to the calendar year level. Therefore, it is not possible to link expenditures with time intervals shorter than a calendar year. This presents a particular analysis problem for the

ESRD population because of the high turnover rate among patients. Each year a large percentage of patients have only a partial year of Medicare coverage due to the high rate of new patients entering the program and the high mortality rate. The descriptive tables shown in this section are based on all ESRD patients ever enrolled during each of the years 1986 through 1991. In order to reduce biases due to differential mortality rates, the reimbursement data in Tables 51 through 55 display reimbursement rates both in unadjusted form and annualized for the average number of days during the year that people in each group were ESRD and Medicare entitled. The annualized values are estimated by a linear extrapolation of the basic per capita figures to a full year (365 days) of coverage. Annualization is most important for the age groups and primary diagnosis classification since, in general, older people and diabetics have the fewest numbers of days at risk. Unless otherwise stated, all results in the following discussion about Tables 51 through 55 are based on annualized values.

Another qualification on these expenditure data concerns the provisions of Medicare as a secondary payer (as described on page 47 under Hospital Inpatient Utilization). Because of this problem, Tables 50 through 55 are based only on patients who have had Medicare coverage for at least 1 year prior to January 1 of the relevant year. An additional criteria was added for dialysis, transplant and graft failure patients. In order to be included in these tables, these patients had to have had some Medicare reimbursements in the observation year. This criteria was not applied to functioning graft patients.

Patients have been grouped in these tables according to four basic treatment categories, as in the chapter on hospitalization. These mutually exclusive and exhaustive groups are: (1) patients on dialysis during their entire coverage period within the observation year; (2) patients receiving a transplant during their coverage period during the observation year; (3) patients receiving a transplant prior to the observation year and maintaining a functioning graft throughout the observation year; and (4) patients receiving a transplant prior to the observation year but whose graft failed during the observation year.

Results

Medicare program expenditures for the years 1986 through 1991 by patient treatment group and by type of service are shown in Table 49. Total expenditures increased from \$3,108.6 million in 1986 to \$6,070.4 million in 1991, an average annual increase of 14.3 percent. The number of persons ever enrolled during each year increased from 136,957 in 1986 to 217,771 in 1991, an average annual increase of 9.7 percent. Dialysis accounted for both the majority of patients and the bulk of program expenditures. In 1986, dialysis patients accounted for 79.6 percent of all patients and 80.9 percent of all program expenditures. By 1991, dialysis patients accounted for 79.2 percent of all patients and 85.4 percent of all program expenditures. The next largest group, in

terms of program expenditures, was persons receiving kidney transplants. In 1991, they accounted for 4.2 percent of all patients and 9.3 percent of all program expenditures. Persons with a functioning graft were the fastest growing group of patients during this time period (see Incidence and Enrollment chapter, Table 8). This group increased at an average annual rate of 13.2 percent (18,408 in 1986 and 34,253 in 1991). As a result, they increased as a percent of the total Medicare enrollment from 13.4 percent in 1986 to 15.7 percent in 1991. However, due to the fact that they were not on maintenance dialysis and that they were beyond the transplant year costs, they accounted for only 3.6 percent of program expenditures in 1986, increasing to 4.0 percent in 1991. Finally, previously transplanted patients experiencing a graft failure accounted for only 0.9 percent of patients and about 1.3 percent of program expenditures in 1991. In 1991, 44.2 percent of program expenditures (\$2,683.2 million) were accounted for by inpatient hospital stays. Outpatient billings (most of which were for maintenance dialysis) accounted for 33.1 percent of program expenditures (\$2,010.2 million). Physician/supplier billings (which included some home dialysis expenditures) accounted for 21.4 percent of expenditures (\$1,300.6 million) and the remaining 1.3 percent was due to skilled nursing facility and home health care use (\$76.3 million). For 1991, the distribution of expenditures by type of service varied greatly by treatment category. Inpatient expenditures for dialysis patients exceeded outpatient expenditures (\$2,066.4 million and \$1,898.7 million respectively), representing 76.4 percent of total dialysis expenditures. An additional \$1,152.6 million, or 22.2 percent of dialysis patient expenditures, was due to physician/supplier billings. The other treatment categories were even more heavily weighted toward inpatient stays. Inpatient stays accounted for 75.3 percent of the costs of transplant patients (\$426.3 million), 60.7 percent of the costs of functioning graft patients (\$145.7 million), and 57.3 percent of the costs of patients experiencing a graft failure (\$44.8 million).

The annual expenditure data expressed in terms of expenditures per enrolled person is shown in Table 50. Overall, Medicare expenditures per enrolled ESRD beneficiary increased from \$24,957 in 1986 to \$31,567 in 1991, an average annual increase of 4.8 percent. For dialysis patients, expenditures in 1986 and 1991 were \$26,700 and \$35,652 respectively. The increase in expenditures for dialysis patients was due mostly to increases in inpatient expenditures (6.0 percent average annual increase) and physician/supplier expenditures (8.4 average percent annual increase). Per capita expenditures for dialysis, represented by outpatient billings, remained essentially unchanged during the 4-year period, 1986 through 1989, with an 8.0 percent increase from 1990 to 1991. The increases in 1990 and 1991 were due largely to the increased use of erythropoietin for the treatment of anemia in dialysis patients. Per capita

expenditures for transplant recipients increased from \$68,036 in 1986 to \$85,832 in 1991, a 4.8 percent annual rate of increase¹. Most of the increase in the costs of transplant patients was due to inpatient expenditures which increased at an annual rate of 4.4 percent, from \$51,731 in 1986 to \$64,277 in 1991. Outpatient expenditures, mainly representing dialysis costs prior to the transplant and dialysis costs for failed grafts, experienced an annual rate of increase of 4.6 percent due, as with dialysis patients, to erythropoietin costs. Per capita expenditures were lowest for patients with a functioning graft. In 1986, expenditures for this group were \$6,160, increasing to \$7,098 by 1991, an average annual increase of 2.9 percent. Inpatient expenditures increased slightly for this group during this period. Physician/supplier costs increased at an annual rate of 6.7 percent, from \$1,287 in 1986 to \$1,778 in 1991. Patients experiencing a graft failure had expenditures of \$33,802 in 1986 and \$43,373 in 1991, an average annual increase of 5.1 percent. However, average expenditures increased by 10.3 percent from 1990 to 1991 and increased in all types of services. The reason(s) for this increase in 1991 are not known.

Tables 51, 52, 53, and 54 show per capita expenditures by age, sex, race, and primary cause of renal failure for the four treatment groups: dialysis, transplant, functioning graft, and graft failure, respectively. The average number of days of Medicare coverage by category in each subgroup (age, sex, race, and diagnosis) is shown in the parentheses. The four tables show that the average days of coverage was 36 days less per year for dialysis patients than for the next lowest group, which was the graft failure patients (293 and 329, respectively). The days of coverage are used to annualize expenditure amounts, shown in the last column of each table. Unless otherwise noted, the following discussion will be based on the annualized expenditure figures.

Unadjusted expenditures for dialysis patients (Table 51) are largely unrelated to age, with all groups showing \$34,000 to \$36,000 per person. However, this understates the relative costs because the average number of days of coverage decreased with age. For example, persons in the youngest age group averaged 347 days of coverage in 1991 while persons 75 years of age and older averaged 256 days of coverage. When the expenditures are annualized, age effects become more evident. Estimated annual per capita expenditures ranged from a low of \$35,911 among persons 15 to 24 years of age to a high of \$50,571 among persons 75 years of age and older—representing a 40.8 percent difference. Female beneficiaries had higher annual per capita expenditures than did male beneficiaries (\$45,925 and \$42,909 respectively). Among racial groups, annual expenditures per person ranged from a low of \$39,778 for Asian persons to a high of \$45,232 for white persons. Annualized per capita expenditures for black persons and American Indians were \$43,490 and \$41,739 respectively. Dialysis patients whose renal failure was attributed to diabetes had the highest expenditure level (\$52,157), followed by persons whose renal failure was attributed to

¹Due to reporting inconsistencies, it was not possible to derive an accurate kidney acquisitions cost for 1991 transplant stays. Therefore, average kidney acquisition costs from 1990 were used in the 1991 calculations.

hypertension (\$45,855). Persons with interstitial nephritis and obstructive nephropathy had annualized expenditure amounts of \$41,498 and \$40,194, respectively, while persons with glomerulonephritis and polycystic kidney disease had annualized expenditure amounts of \$38,723 and \$36,464, respectively.

Annualized expenditures for transplant recipients (Table 52) ranged from a low of \$81,383 for persons 15 to 24 years of age to a high of \$95,755 for persons 65 to 74 years of age. Males had slightly higher annualized expenditure levels than did females (\$89,166 and \$87,279, respectively). American Indian transplant recipients had the lowest (\$80,367) and black transplant recipients had the highest (\$90,365) annualized per capita expenditures. Among diagnostic categories, transplant recipients whose renal failure was attributed to diabetes had the highest average expenditures (\$93,965). The lowest average annualized expenditures were among persons whose renal failure was attributed to glomerulonephritis (\$82,339) and interstitial nephritis (\$81,827).

Average annualized expenditures for functioning graft patients (Table 53) ranged, by age, from a low of \$5,338 for persons 15 to 24 years of age to a high of \$9,974 for persons 65 to 74 years of age. There was little difference in annualized expenditures between male and female beneficiaries (\$7,250 and \$7,600, respectively). Black beneficiaries had the highest average annualized expenditures (\$8,725), followed by American Indians (\$8,126), white (\$7,199), and Asian (\$4,691) beneficiaries. Table 53 also shows that the average annualized expenditures per person for functioning graft patients was highest for patients whose renal failure was attributed to diabetic nephropathy (\$12,570), followed by persons whose renal failure was attributed to hypertension (\$7,479) polycystic kidney disease (\$6,398) and interstitial nephritis (\$6,358). Per capita annualized expenditures were the lowest for those whose renal failure was attributed to obstructive nephropathy (\$5,463), and glomerulonephritis (\$5,423).

Among graft failure patients (Table 54), per capita annualized expenditures were over \$50,000 for persons ages 25-34 years of age and for persons over 55 years of age. Female beneficiaries had average annualized expenditures which were \$6,049 greater than male beneficiaries (\$51,916 and \$45,867 respectively). The \$6,000 difference between males and females was largely due to higher hospitalization rates among females (see Table 47 in hospitalization section). Asian beneficiaries had the highest average annualized expenditures (\$51,923) followed by white (\$49,752) and black (\$44,971) beneficiaries. Among diagnostic groups, the highest average per person annualized expenditures were those whose renal failure was attributed to diabetic nephropathy (\$58,808). Annualized expenditures for the other groups ranged from a low of \$41,928 for obstructive nephropathy to a high of \$51,069 for polycystic kidney disease.

Table 55 shows Medicare program expenditure rates for dialysis patients by State of residence. It is based on the same selection criteria used in Table 51. That is, it shows average expenditure amounts for persons on dialysis for whom Medicare is the primary payer.

Overall, average Medicare expenditures for non-Medicare secondary payer dialysis patients in 1991 was \$35,652. On an annualized basis, this amounted to \$44,413 per person. This varied considerably by State. States with average annualized expenditure amounts over \$50,000 included Massachusetts (\$55,516), Connecticut (\$52,890), and Pennsylvania (\$51,831). Among the 51 States and the District of Columbia, the lowest average expenditure rates were found in Utah (\$31,856), Idaho (\$33,688), and Mississippi (\$34,896). The lowest expenditure rates were found in Puerto Rico (\$28,880) and other areas (\$29,485).

Table 49
Medicare end stage renal disease program expenditures,
by patient treatment group: 1986-91

Treatment group	1986	1987	1988	1989	1990	1991	Percent distribution 1991	Average annual percent change 1986-91
Expenditures in millions								
Total								
Number of patients	136,957	148,771	165,894	181,189	198,273	217,771	100.0	9.7
Expenditures								
Total	\$3,108.6	\$3,441.7	\$3,851.1	\$4,527.9	\$5,261.3	\$6,070.4	100.0	14.3
Inpatient	1,434.9	1,565.4	1,740.8	2,073.7	2,362.3	2,683.2	44.2	13.3
Outpatient	1,076.6	1,177.4	1,292.6	1,425.6	1,729.4	2,010.2	33.1	13.3
Physician/supplier	581.1	682.0	797.7	1,001.9	1,123.0	1,300.6	21.4	17.5
Other ¹	16.0	17.0	20.0	26.6	46.6	76.3	1.3	36.7
Dialysis								
Number of patients	109,060	116,858	130,888	143,478	156,898	172,426	79.2	9.6
Expenditures								
Total	2,513.9	2,796.6	3,199.6	3,802.9	4,424.4	5,186.2	100.0	15.6
Inpatient	996.0	1,098.8	1,282.4	1,566.1	1,773.3	2,066.4	39.8	15.7
Outpatient	1,004.9	1,097.8	1,208.4	1,336.4	1,624.8	1,898.7	36.6	13.6
Physician/supplier	498.8	585.2	691.3	877.0	984.9	1,152.6	22.2	18.2
Other ¹	14.1	14.8	17.5	23.5	41.4	68.5	1.3	37.2
Transplant								
Number of patients	8,274	8,235	8,079	8,093	8,895	9,210	4.2	2.2
Expenditures ²								
Total	441.9	457.0	437.5	467.4	555.7	565.9	100.0	5.1
Inpatient	340.6	350.7	328.3	351.5	420.9	426.3	75.3	4.6
Outpatient	48.9	50.2	50.9	50.8	62.3	65.3	11.5	6.0
Physician/supplier	51.7	55.6	57.7	64.3	71.2	72.4	12.8	7.0
Other ¹	0.6	0.6	0.7	0.7	1.3	1.9	0.3	25.5
Functioning graft								
Number of patients	18,408	22,181	25,305	27,788	30,636	34,253	15.7	13.2
Expenditures								
Total	113.3	137.1	156.5	185.6	211.6	240.1	100.0	16.2
Inpatient	75.7	86.7	96.7	113.7	128.6	145.7	60.7	14.0
Outpatient	12.9	17.0	20.2	23.4	25.9	28.7	12.0	17.4
Physician/supplier	23.6	32.0	37.9	46.4	53.4	60.2	25.1	20.6
Other ¹	1.1	1.4	1.7	2.1	3.7	5.4	2.2	37.4
Graft failure								
Number of patients	1,215	1,497	1,622	1,862	1,889	1,933	0.9	9.7
Expenditures								
Total	39.4	51.0	57.6	71.9	69.6	78.2	100.0	14.7
Inpatient	22.5	29.2	33.5	42.4	39.4	44.8	57.3	14.7
Outpatient	9.8	12.4	13.1	15.1	16.5	17.5	22.3	12.2
Physician/supplier	6.9	9.2	10.8	14.2	13.5	15.4	19.7	17.4
Other ¹	0.2	0.1	0.2	0.3	0.3	0.5	0.7	21.8

¹Other includes skilled nursing facility and home health services.

²Due to reporting inconsistencies, it was not possible to derive an accurate kidney acquisitions cost for 1991 transplant stays. Therefore, average kidney acquisition costs from 1990 were used in the 1991 calculations.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, April 1993 update, 1986-91.

Table 50
Medicare end stage renal disease program expenditures per patient,
by patient treatment group, excluding Medicare secondary payer patients¹: 1986-91

Treatment group	1986	1987	1988	1989	1990	1991	Average annual percent change 1986-91
Expenditures per person							
Total							
Number of patients	99,769	108,474	120,416	132,714	145,636	160,767	10.0
Expenditures (per patient)							
Total	\$24,957	\$25,501	\$25,852	\$27,725	\$29,478	\$31,567	4.8
Inpatient	11,087	11,190	11,384	12,436	12,989	13,737	4.4
Outpatient	8,999	9,057	8,936	8,927	9,859	10,601	3.3
Physician/supplier	4,737	5,122	5,393	6,191	6,358	6,820	7.6
Other ²	134	132	139	171	272	410	25.0
Dialysis							
Number of patients	78,228	83,751	92,583	101,799	111,411	122,811	9.4
Expenditures (per patient)							
Total	26,700	27,891	28,675	31,023	33,038	35,652	6.0
Inpatient	10,443	10,890	11,403	12,713	13,198	14,099	6.2
Outpatient	10,810	11,040	10,946	10,967	12,165	13,134	4.0
Physician/supplier	5,296	5,812	6,167	7,147	7,360	7,940	8.4
Other ²	152	149	159	196	315	480	25.9
Transplant							
Number of patients	3,876	3,729	3,766	3,767	4,350	4,645	3.7
Expenditures (per patient) ³							
Total	68,036	70,559	71,336	75,876	81,392	85,832	4.8
Inpatient	51,731	53,128	52,903	56,572	61,233	64,277	4.4
Outpatient	8,270	8,597	8,903	8,888	9,696	10,366	4.6
Physician/supplier	7,936	8,731	9,412	10,292	10,269	10,896	6.5
Other ²	99	104	117	124	193	293	24.2
Functioning graft							
Number of patients	16,627	19,721	22,719	25,522	28,258	31,620	13.7
Expenditures (per patient)							
Total	6,160	6,184	6,124	6,698	6,886	7,098	2.9
Inpatient	4,120	3,935	3,800	4,120	4,202	4,319	0.9
Outpatient	694	754	780	829	826	842	4.0
Physician/supplier	1,287	1,431	1,480	1,671	1,736	1,778	6.7
Other ²	59	65	65	78	122	159	21.9
Graft failure							
Number of patients	1,038	1,273	1,348	1,626	1,617	1,691	10.3
Expenditures (per patient)							
Total	33,802	35,541	37,431	39,739	39,308	43,373	5.1
Inpatient	19,416	20,534	21,908	23,398	22,305	24,722	5.0
Outpatient	8,293	8,572	8,477	8,390	9,306	9,810	3.4
Physician/supplier	5,932	6,333	6,936	7,806	7,537	8,538	7.6
Other ²	161	103	109	145	161	303	13.5

¹Expenditures were calculated only for persons who had at least one full year of Medicare entitlement prior to the observation year. Thus, any patients for whom Medicare was a secondary payer were not included.

²Other includes skilled nursing facility and home health services.

³Due to reporting inconsistencies, it was not possible to derive an accurate kidney acquisitions cost for 1991 transplant stays. Therefore, average kidney acquisition costs from 1990 were used in the 1991 calculations.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, April 1993 update, 1986-91.

Table 51

**Medicare end stage renal disease program expenditures for dialysis patients, by age, sex, race,
and primary diagnosis, excluding Medicare secondary payer patients¹: 1991**

Age, sex, race, and primary diagnosis	Number of persons ²	Expenditures per person					Annualized
		Inpatient	Outpatient	Physician/ supplier	Other	Total	
Total	122,811 (293)	\$14,099	\$13,134	\$7,940	\$480	\$35,652	\$44,413
Age							
Under 15 years	305 (347)	12,715	14,601	7,275	88	34,679	36,478
15 - 24 years	1,734 (353)	12,172	15,786	6,701	71	34,730	35,911
25 - 34 years	6,242 (346)	12,169	15,283	6,997	173	34,621	36,522
35 - 44 years	10,867 (339)	11,974	15,028	7,233	206	34,440	37,081
45 - 54 years	13,483 (332)	12,559	15,070	7,557	315	35,501	39,030
55 - 64 years	20,794 (313)	13,001	14,307	7,696	412	35,416	41,300
65 - 74 years	42,745 (273)	15,286	12,258	8,311	578	36,432	48,709
75 years or over	26,641 (256)	15,290	11,177	8,327	675	35,469	50,571
Sex							
Male	61,742 (292)	13,492	12,823	7,620	392	34,327	42,909
Female	61,069 (294)	14,712	13,447	8,264	569	36,992	45,925
Race							
Asian	2,201 (301)	10,729	15,199	6,640	235	32,803	39,778
Black	41,047 (311)	14,215	14,551	7,842	448	37,056	43,490
White	76,380 (283)	14,193	12,283	8,081	513	35,070	45,232
American Indian	1,355 (303)	13,836	14,001	6,556	256	34,649	41,739
Other/unknown	1,828 (319)	11,800	13,718	6,857	273	32,648	37,356
Primary diagnosis							
Diabetes	33,038 (275)	16,662	12,751	9,070	812	39,296	52,157
Glomerulonephritis	17,135 (317)	11,849	14,297	7,245	240	33,631	38,723
Hypertension	37,243 (283)	14,347	12,889	7,889	429	35,553	45,855
Polycystic kidney disease	4,434 (326)	10,557	14,623	7,171	217	32,568	36,464
Interstitial nephritis	4,432 (303)	12,710	13,725	7,608	407	34,449	41,498
Obstructive nephropathy	3,216 (300)	12,385	13,000	7,233	418	33,036	40,194
Other	6,309 (292)	15,602	12,431	7,897	381	36,311	45,389
Unknown	8,493 (301)	13,244	13,268	7,328	354	34,195	41,466
Not reported	8,511 (333)	10,545	12,700	6,664	294	30,203	33,105

¹Expenditures were calculated only for persons who had at least one full year of Medicare entitlement prior to the observation year. Thus, any patients for whom Medicare was a secondary payer were not included.

²Average number of days of Medicare coverage shown in parentheses.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, April 1993 update, 1991.

Table 52

Medicare end stage renal disease program expenditures for transplant patients, by age, sex, race, and primary diagnosis, excluding Medicare secondary payer patients¹: 1991

Age, sex, race, and primary diagnosis	Number of persons ³	Expenditures per person ²					Annualized
		Inpatient	Outpatient	Physician/supplier	Other	Total	
Total	4,645 (355)	\$64,277	\$10,366	\$10,896	\$293	\$85,832	\$88,250
Age							
Under 15 years	103 (355)	60,286	11,377	11,678	99	83,440	85,790
15 - 24 years	378 (361)	60,985	10,177	9,280	48	80,491	81,383
25 - 34 years	957 (360)	64,857	10,474	10,353	178	85,862	87,055
35 - 44 years	1,193 (356)	62,700	10,106	11,132	266	84,203	86,332
45 - 54 years	991 (355)	66,987	10,472	11,196	360	89,015	91,522
55 - 64 years	728 (352)	64,516	10,337	11,352	563	86,768	89,973
65 - 74 years	289 (332)	64,792	10,726	11,325	254	87,098	95,755
75 years or over	6	—	—	—	—	—	—
Sex							
Male	2,755 (354)	64,985	10,365	10,880	250	86,479	89,166
Female	1,890 (355)	63,246	10,368	10,918	356	84,888	87,279
Race							
Asian	133 (357)	60,509	10,207	9,896	101	80,713	82,522
Black	1,259 (357)	67,014	10,712	10,319	339	88,384	90,365
White	3,165 (354)	63,392	10,240	11,212	285	85,129	87,774
American Indian	53 (355)	59,794	9,392	8,643	336	78,165	80,367
Other/unknown	35 (362)	66,997	11,376	10,246	68	88,687	89,422
Primary diagnosis							
Diabetes	868 (351)	66,900	10,362	12,297	802	90,361	93,965
Hypertension	757 (356)	69,420	10,682	10,952	236	91,290	93,598
Glomerulonephritis	1,284 (359)	60,595	10,111	10,156	122	80,985	82,339
Interstitial nephritis	177 (357)	59,550	10,202	10,147	135	80,034	81,827
Obstructive nephropathy	99 (361)	65,039	10,748	11,263	104	87,154	88,120
Polycystic kidney disease	323 (356)	65,902	10,702	10,797	170	87,570	89,784
Other	350 (353)	61,985	11,018	10,774	115	83,892	86,744
Unknown	369 (358)	60,779	10,434	10,745	179	82,138	83,744
Not reported	418 (343)	66,400	9,700	10,695	322	87,116	92,704

¹Expenditures were calculated only for persons who had at least one full year of Medicare entitlement prior to the observation year. Thus, any patients for whom Medicare was a secondary payer were not included.

²Due to reporting inconsistencies, it was not possible to derive an accurate kidney acquisitions cost for 1991 transplant stays. Therefore, average kidney acquisition costs from 1990 were used in the 1991 calculations.

³Average number of days of Medicare coverage shown in parentheses.

NOTE: Rates based on fewer than 30 observations are not displayed.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System; April 1993 update, 1991.

Table 53

Medicare end stage renal disease program expenditures for functioning graft patients, by age, sex, race, and primary diagnosis, excluding Medicare secondary payer patients¹: 1991

Age, sex, race, and primary diagnosis	Number of persons ²	Expenditures per person				Total	Annualized
		Inpatient	Outpatient	Physician/ supplier	Other		
Total	31,620 (351)	\$4,319	\$842	\$1,778	\$159	\$7,098	\$7,381
Age							
Under 15 years	724 (342)	3,933	979	1,067	35	6,014	6,418
15 - 24 years	1,963 (351)	3,224	740	1,148	21	5,133	5,338
25 - 34 years	6,178 (354)	3,803	837	1,515	77	6,233	6,427
35 - 44 years	9,015 (352)	3,994	809	1,664	150	6,616	6,860
45 - 54 years	7,013 (350)	4,685	858	1,892	215	7,651	7,979
55 - 64 years	4,943 (347)	5,045	883	2,168	227	8,323	8,755
65 - 74 years	1,692 (352)	5,711	926	2,712	271	9,619	9,974
75 years or over	92 (352)	4,811	727	2,773	452	8,763	9,087
Sex							
Male	19,328 (350)	4,245	822	1,730	155	6,952	7,250
Female	12,292 (352)	4,436	875	1,853	165	7,329	7,600
Race							
Asian	706 (353)	2,494	693	1,287	63	4,537	4,691
Black	5,512 (353)	5,351	972	1,895	219	8,438	8,725
White	24,770 (350)	4,157	821	1,776	149	6,903	7,199
American Indian	318 (353)	5,197	925	1,622	116	7,859	8,126
Other/unknown	314 (358)	2,205	545	1,109	100	3,959	4,036
Primary diagnosis							
Diabetes	6,015 (349)	7,565	1,142	2,850	462	12,019	12,570
Glomerulonephritis	8,580 (352)	3,019	753	1,396	62	5,230	5,423
Hypertension	3,853 (353)	4,379	887	1,831	136	7,233	7,479
Polycystic kidney disease	2,337 (350)	3,577	796	1,678	84	6,135	6,398
Interstitial nephritis	1,372 (352)	3,876	625	1,572	58	6,132	6,358
Obstructive nephropathy	839 (354)	3,047	709	1,365	177	5,298	5,463
Other	2,216 (349)	3,834	910	1,473	26	6,243	6,529
Unknown	2,363 (351)	3,564	800	1,513	75	5,953	6,190
Not reported	4,045 (349)	3,743	660	1,479	130	6,012	6,288

¹Expenditures were calculated only for persons who had at least one full year of Medicare entitlement prior to the observation year. Thus, any patients for whom Medicare was a secondary payer were not included.

²Average number of days of Medicare coverage shown in parentheses.

NOTE: Rates based on fewer than 30 observations are not displayed.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, April 1993 update, 1991.

Table 54

Medicare end stage renal disease program expenditures for graft failure patients, by age, sex, race, and primary diagnosis, excluding Medicare secondary payer patients¹: 1991

Age, sex, race, and primary diagnosis	Number of persons ²	Expenditures per person				Total	Annualized
		Inpatient	Outpatient	Physician/supplier	Other		
Total	1,691 (329)	\$24,722	\$9,810	\$8,538	\$303	\$43,373	\$48,119
Age							
Under 15 years	28	—	—	—	—	—	—
15 - 24 years	180 (335)	22,999	10,965	7,840	43	41,847	45,594
25 - 34 years	385 (330)	26,304	10,374	8,377	221	45,278	50,080
35 - 44 years	473 (333)	23,388	9,243	8,106	250	40,987	44,926
45 - 54 years	361 (327)	24,446	9,539	8,761	393	43,139	48,152
55 - 64 years	213 (318)	26,285	9,352	9,830	594	46,061	52,869
65 - 74 years	49 (305)	23,791	10,343	8,632	621	43,388	51,923
75 years or over	2	—	—	—	—	—	—
Sex							
Male	1,027 (329)	23,103	9,961	8,035	245	41,343	45,867
Female	664 (327)	27,227	9,578	9,314	393	46,511	51,916
Race							
Asian	34 (315)	27,611	9,590	7,581	28	44,810	51,923
Black	545 (342)	23,533	10,456	7,928	221	42,137	44,971
White	1,080 (322)	25,112	9,512	8,909	357	43,891	49,752
American Indian	21	—	—	—	—	—	—
Other/unknown	11	—	—	—	—	—	—
Primary diagnosis							
Diabetes	288 (320)	30,665	8,903	11,022	969	51,558	58,808
Glomerulonephritis	460 (327)	20,946	10,004	7,703	213	38,865	43,381
Hypertension	373 (332)	24,819	9,465	8,059	110	42,453	46,673
Polycystic kidney disease	91 (323)	27,139	9,205	8,599	250	45,193	51,069
Interstitial nephritis	69 (336)	25,361	11,299	8,375	102	45,136	49,032
Obstructive nephropathy	31 (325)	18,577	10,945	7,802	10	37,333	41,928
Other	146 (341)	23,733	10,100	8,168	113	42,114	45,078
Unknown	136 (325)	21,356	10,330	7,740	282	39,708	44,595
Not reported	97 (336)	30,062	10,895	8,932	94	49,983	54,297

¹Expenditures were calculated only for persons who had at least one full year of Medicare entitlement prior to the observation year. Thus, any patients for whom Medicare was a secondary payer were not included.

²Average number of days of Medicare coverage shown in parentheses.

NOTE: Rates based on fewer than 30 observations are not displayed.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, April 1993 update, 1991.

Table 55
Medicare end stage renal disease program expenditures by State
for dialysis patients, excluding Medicare secondary payer patients¹: 1991

State	Number of persons ²	Expenditures per person					Annualized
		Inpatient	Outpatient	Physician/ supplier	Other	Total	
Total	122,811 (293)	\$14,099	\$13,134	\$7,940	\$480	\$35,652	\$44,413
Alabama	2,536 (302)	11,404	12,629	7,961	412	32,406	39,166
Alaska	61 (302)	13,600	17,082	6,874	346	37,902	45,809
Arizona	1,806 (288)	14,190	12,373	8,199	445	35,207	44,620
Arkansas	1,080 (289)	13,103	11,807	6,851	453	32,214	40,686
California	13,213 (290)	16,041	14,590	8,161	459	39,250	49,401
Colorado	1,016 (298)	11,875	13,075	5,855	425	31,229	38,250
Connecticut	1,618 (289)	16,098	14,641	10,202	936	41,877	52,890
Delaware	382 (301)	14,875	12,092	8,968	218	36,154	43,841
District of Columbia	746 (299)	17,597	13,350	8,495	383	39,826	48,617
Florida	7,411 (289)	12,207	12,653	9,353	772	34,986	44,186
Georgia	3,874 (304)	13,372	12,383	7,362	407	33,524	40,251
Hawaii	677 (301)	12,739	14,075	5,321	293	32,427	39,322
Idaho	279 (291)	9,137	13,038	4,308	374	26,858	33,688
Illinois	5,636 (290)	14,094	12,559	7,009	431	34,093	42,910
Indiana	2,435 (295)	13,013	13,401	6,479	319	33,213	41,094
Iowa	1,043 (292)	11,231	13,468	5,295	235	30,229	37,786
Kansas	1,043 (298)	13,656	13,732	7,013	300	34,702	42,504
Kentucky	1,451 (287)	12,204	11,396	9,066	518	33,184	42,203
Louisiana	2,993 (293)	14,825	13,051	9,841	683	38,400	47,836
Maine	323 (283)	14,528	12,182	7,509	939	35,159	45,346
Maryland	2,635 (299)	16,818	13,985	8,767	383	39,954	48,773
Massachusetts	2,513 (287)	18,687	12,844	11,035	1,086	43,652	55,516
Michigan	4,405 (292)	13,518	13,950	6,419	478	34,364	42,955
Minnesota	1,423 (292)	15,856	13,326	4,623	269	34,074	42,593
Mississippi	1,889 (309)	9,600	12,397	7,035	510	29,542	34,896
Missouri	2,454 (286)	13,526	13,228	7,558	497	34,809	44,424
Montana	264 (277)	10,663	12,866	3,856	251	27,637	36,417
Nebraska	559 (291)	9,987	10,112	7,851	144	28,094	35,238
Nevada	440 (280)	12,893	10,757	9,791	534	33,975	44,289
New Hampshire	343 (288)	15,400	11,777	7,230	554	34,960	44,307
New Jersey	4,616 (291)	14,989	12,710	9,105	272	37,076	46,504
New Mexico	661 (292)	13,088	12,165	6,710	224	32,187	40,234
New York	9,360 (299)	17,558	13,619	8,753	405	40,335	49,238
North Carolina	3,815 (303)	11,334	13,034	6,846	449	31,663	38,142
North Dakota	206 (281)	12,083	10,309	4,366	372	27,130	35,240
Ohio	4,824 (290)	14,701	13,468	7,934	386	36,488	45,925
Oklahoma	1,202 (291)	11,917	12,046	6,050	446	30,459	38,205
Oregon	1,002 (289)	10,589	13,335	5,628	502	30,054	37,957
Pennsylvania	6,417 (286)	17,226	12,794	10,137	455	40,613	51,831
Puerto Rico	1,525 (302)	4,636	11,868	7,199	193	23,895	28,880
Rhode Island	520 (285)	15,709	12,058	8,780	895	37,442	47,952
South Carolina	2,377 (300)	10,960	12,719	6,684	336	30,700	37,352
South Dakota	249 (283)	12,259	14,484	4,150	86	30,980	39,957
Tennessee	2,498 (292)	13,051	11,894	7,227	1,028	33,201	41,501
Texas	8,710 (298)	13,579	12,979	8,642	565	35,765	43,806
Utah	320 (300)	9,052	12,834	3,866	431	26,183	31,856
Vermont	155 (280)	14,632	13,344	4,979	744	33,699	43,929
Virginia	3,464 (295)	12,792	12,957	6,710	318	32,776	40,553
Washington	1,630 (290)	13,215	14,621	5,332	500	33,668	42,375
West Virginia	732 (288)	12,614	12,376	6,579	240	31,809	40,313
Wisconsin	1,617 (286)	11,593	12,762	5,279	246	29,880	38,134
Wyoming	114 (291)	12,641	10,564	6,200	889	30,294	37,998
Other	249 (319)	7,046	13,190	5,346	196	25,778	29,485

¹Expenditures were calculated only for persons who had at least one full year of Medicare entitlement prior to the observation year. Thus, any patients for whom Medicare was a secondary payer were not included.

²Average number of days of Medicare coverage shown in parentheses.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, April 1993 update, 1991.

Providers of renal care

This section discusses the growth in the number of participating renal providers furnishing some form of service to end stage renal disease (ESRD) patients. For the purpose of this report, the following definitions apply. "Dialysis facility" refers to all providers approved by Medicare to furnish at least one type of dialysis service. A "dialysis center" is a hospital-based unit which, in addition to providing dialysis service(s), is also approved to furnish the full spectrum of diagnostic, therapeutic, and rehabilitative services. The term "transplant center" includes all hospitals approved to do kidney transplants. The term "renal provider" encompasses all of the units described above. Please note that the number of Medicare renal providers reported in Tables 56, 57, and 58 does not equal the total number of surveyed Medicare renal providers reported Tables 20 through 35. A complete explanation of this difference may be found on page 22 of this report.

Growth in numbers and types of renal providers

Since the Medicare ESRD program began in 1973, the total number of Medicare-approved renal providers has almost quadrupled from 606 in 1973 (not shown) to 2,344 in December 1992 (Table 56). However, since 1987, the increase in total numbers of renal providers has remained relatively constant at about 6.5 percent annually. Rates of increase calculated from the data in Table 57 show that the increase in 1992 was 6.4 percent; in 1991 was 6.3 percent; and in 1990 was 6.9 percent.

The specific increase in the number of dialysis facilities has been primarily among freestanding facilities; i.e., facilities not affiliated with hospitals. In 1973 there were only about 68 freestanding facilities (not shown), which represented about 11 percent of the total number of Medicare-approved dialysis facilities in operation at that time. At the end of 1992, there were 1,495 freestanding dialysis facilities, which represented about 63.8 percent of the total. The rates of increase for

freestanding dialysis facilities calculated from the data in Table 57, show that the increase in 1992 was 8.6 percent; in 1991 was 7.4 percent; in 1990 was 10.1 percent; and in 1989 was 9.2 percent.

Table 57 shows that, in 1988, renal providers were split almost evenly between proprietary and nonprofit (49.9 and 50.1 percent, respectively). By 1992, the proprietary organizations accounted for 11.0 percent more providers than the nonprofit organizations (55.5 and 44.5 percent, respectively). The clear trend is that, while the number of providers in both groups is increasing each year, the proprietary organizations are increasing at a faster rate.

Type of renal care provided

In 1992, 10,115 renal transplants were reported in Medicare-approved transplant centers (see Table 29). ESRD patients who do not receive kidney transplants receive dialysis care either at home or at one of the 2,222 dialysis facilities, as displayed in the Treatment Trends section of this report. These facilities may be in either a hospital setting (of which there were 217 dialysis facilities and 510 dialysis centers at the end of 1992) or a nonhospital setting (of which there were 1,495 at the end of 1992). As stated in footnote to Table 58, the categories will not add across to the total because some renal providers have both a transplant center and a dialysis facility. In fact, at the end of 1992, 165 of the 510 dialysis centers noted above were in hospitals that also had approved transplant centers. Finally, 57 other dialysis centers are defined as inpatient centers because they provide backup dialysis services only, and 20 percent or less of their dialysis service is provided on an outpatient basis. (These 57 centers are not included in the 2,222 outpatient dialysis providers described above.)

Table 56
**Approved end stage renal disease providers of service by type of service and
number of approved dialysis stations: 1983-92**

Year	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Total providers	1,308	1,368	1,463	1,578	1,701	1,819	1,938	2,072	2,202	2,344
Transplant hospitals										
Transplant center only	13	25	31	34	39	41	53	53	60	65
Transplant/dialysis centers	146	145	147	149	160	161	165	169	168	165
Other hospitals/satellites										
Inpatient care only	49	53	52	45	42	44	55	51	58	57
Dialysis centers	401	380	359	353	351	349	332	332	333	345
Dialysis facilities	111	117	126	136	149	158	169	186	207	217
Non-hospitals										
Dialysis facilities	626	668	748	861	960	1,066	1,164	1,281	1,376	1,495
Total approved Outpatient stations	15,506	16,594	17,845	19,383	21,246	22,605	23,654	25,052	28,812	30,455

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, 1983-92.

Table 57
**Number and percent of approved end stage renal disease providers,
by type of ownership: 1988-92**

Type of ownership	1988		1989		1990		1991		1992	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	1,819	100.0	1,938	100.0	2,072	100.0	2,202	100.0	2,344	100.0
Proprietary	907	49.9	999	51.5	1,103	53.2	1,191	54.1	1,300	55.5
Hospital-based	26	1.4	28	1.4	28	1.3	32	1.5	32	1.4
Freestanding	881	48.4	971	50.1	1,075	51.9	1,159	52.6	1,268	54.1
Nonprofit	912	50.1	939	48.5	969	46.8	1,011	45.9	1,044	44.5
Hospital-based	727	40.0	746	38.5	763	36.9	794	36.1	817	34.8
Freestanding	185	10.2	193	10.0	206	9.9	217	9.9	227	9.7

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, 1988-92.

Table 58
Approved end stage renal disease providers of service,
and number of approved dialysis stations, by State: December 1992

State	Total providers of service ¹	Hospital transplant centers	Outpatient dialysis facilities			Inpatient hospital dialysis centers	Approved dialysis stations total	Facilities training in self-dialysis
			Total	Hospital	Freestanding			
Total	2,344	230	2,222	727	1,495	57	30,455	1,352
Alabama	48	2	47	3	44	1	637	27
Alaska	2	0	2	0	2	0	25	1
Arizona	48	5	45	8	37	1	534	29
Arkansas	37	3	36	10	26	1	435	22
California	254	25	235	38	197	4	3,286	153
Colorado	20	4	18	5	13	0	265	14
Connecticut	20	2	20	15	5	0	240	17
Delaware	7	0	6	1	5	1	106	4
District of Columbia	21	5	21	8	13	0	260	11
Florida	160	7	155	21	134	5	2,266	83
Georgia	87	4	85	16	69	0	1,289	44
Hawaii	12	1	12	7	5	0	138	2
Idaho	7	0	7	6	1	0	57	3
Illinois	103	8	96	41	55	7	1,333	56
Indiana	42	2	41	19	22	1	585	29
Iowa	17	3	16	12	4	0	204	13
Kansas	20	2	18	1	17	1	254	8
Kentucky	33	3	32	7	25	0	382	21
Louisiana	74	7	69	8	61	1	890	33
Maine	6	1	6	4	2	0	65	5
Maryland	60	3	57	11	46	3	894	45
Massachusetts	44	10	43	20	23	0	514	29
Michigan	59	10	57	30	27	0	814	39
Minnesota	37	4	34	25	9	0	337	7
Mississippi	38	1	38	4	34	0	541	10
Missouri	57	9	52	20	32	3	645	35
Montana	7	0	7	6	1	0	62	5
Nebraska	16	3	11	9	2	4	111	8
Nevada	6	2	5	2	3	0	74	4
New Hampshire	6	0	6	2	4	0	54	6
New Jersey	40	3	40	29	11	0	659	30
New Mexico	19	2	17	8	9	0	159	11
New York	123	15	123	85	38	0	1,650	84
North Carolina	68	5	66	8	58	1	983	31
North Dakota	11	3	10	10	0	0	72	5
Ohio	58	12	58	36	22	0	769	37
Oklahoma	40	6	39	20	19	0	424	16
Oregon	18	1	18	11	7	0	175	14
Pennsylvania	125	11	107	35	72	17	1,580	92
Puerto Rico	25	1	23	8	15	2	414	14
Rhode Island	7	0	7	2	5	0	121	6
South Carolina	47	1	46	1	45	1	697	9
South Dakota	8	0	8	8	0	0	54	2
Tennessee	63	8	57	4	53	0	845	20
Texas	161	17	149	25	124	2	2,675	98
Utah	17	2	16	8	8	0	139	9
Vermont	2	1	2	2	0	0	19	1
Virgin Islands	1	1	1	1	0	0	8	0
Virginia	78	5	77	22	55	0	877	54
Washington	25	5	22	11	11	0	255	12
West Virginia	15	2	15	7	8	0	156	11
Wisconsin	40	3	39	25	14	1	384	32
Wyoming	2	0	2	0	2	0	17	1
American Samoa	1	0	1	1	0	0	9	0
Guam	1	0	1	1	0	0	12	0
Mariana Islands	1	0	1	0	1	0	5	0

¹Categories do not add across to total because some hospital transplant centers also provide outpatient services and are counted again in that category. See Table 56 for a recap of the total in which categories do not overlap.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, December 1992.

End stage renal disease studies

Centers for Disease Control survey

The Centers for Disease Control (CDC) annually surveys dialysis facilities using their Form 53.7, "National Surveillance of Dialysis-Associated Diseases." The CDC form is mailed by the Health Care Financing Administration to Medicare dialysis facilities along with the HCFA-2744, End Stage Renal Disease Facility Survey. As CDC surveys are received, they are forwarded to CDC for appropriate analyses.

Following is an explanation of the contents of the report entitled, "National Surveillance of Dialysis-Associated Diseases in the United States, 1992."

National Surveillance of Dialysis-Associated Diseases in the United States, 1992

by Jerome I. Tokars, M.D., M.P.H., Miriam J. Alter, Ph.D. and Martin S. Favero, Ph.D.

In conjunction with the annual facility survey performed by the Health Care Financing Administration (HCFA) for calendar year 1992, the Centers for Disease Control (CDC) distributed by mail a questionnaire to all 2,321 chronic hemodialysis centers approved by HCFA. Information was collected on:

- The use of specific hemodialysis practices (e.g., high flux dialysis, bicarbonate dialysate, and reuse of disposable equipment).
- The incidence and prevalence of hepatitis B virus (HBV) infection, the prevalence of antibody to hepatitis B surface antigen (anti-HBs), the use of hepatitis B vaccine, and the incidence of non-A non-B hepatitis, in patients and staff.
- The occurrence of other hemodialysis-associated complications and diseases (e.g., pyrogenic reactions, new dialyzer syndrome).
- The number of patients with human immunodeficiency virus (HIV) infection and policies for testing of patients for HIV.

The reported incidence and prevalence of (HBV) infection among patients and staff was measured by using hepatitis B surface antigen (HBsAg) and anti-HBs as markers. Incidence was defined as the percentage of all patients or staff present in the facility for at least 1 month in 1992 who became positive for HBsAg during 1992. Prevalence was defined as the percentage of all patients or staff present in the facility during the first week of December 1992 who were positive for HBsAg or for anti-HBs.

Data were analyzed with the chi square or Fisher's exact test for differences in proportions. When adjustment for confounding variables was required, the Mantel-Haenszel test or stepwise logistic regression was

used. A P-value of less than 0.05 was considered significant.

Questionnaires were returned by 2,170 centers, a response rate of 93 percent. These centers represented 170,028 patients and 43,535 staff members. Approximately 44 percent of facilities were recontacted for clarification of data. The percentage of centers that reported reuse of disposable dialyzers continued to increase and in 1992, 72 percent of the centers reported that they reused disposable dialyzers. Ninety-four percent of centers used bicarbonate as their primary method of dialysis in 1992 (compared with 22 percent in 1986) and 35 percent of centers reported treating patients with high flux dialysis. The reported incidence of HBV infection was 0.1 percent among patient and 0.03 percent among staff members. Receipt of three doses of hepatitis B vaccine was reported for 24 percent of patients and 69 percent of staff members. Pyrogenic reactions in the absence of septicemia were reported by 19 percent of centers. HIV infection was reported in 1.5 percent of patients, and AIDS in 0.7 percent of patients.

Please refer any questions or requests for this report to: Investigation and Prevention Branch (Hospital Infections Program) or Hepatitis Branch (Division of Viral Diseases), National Center for Infectious Diseases, Centers for Disease Control, Atlanta, Georgia 30333.

Health Care Financing Administration grant activity summaries

The Health Care Financing Administration is presently involved in many research activities that deal with or touch on the end stage renal disease program. These activities range from internal HCFA reviews to full-scope extramural studies that are covered under the grant or cooperative agreement process.

Summaries of these activities follow.

Medicare Program-End Stage Renal Disease Dialysis Codes and Billing Patterns

Project No.:	99-C-98489/9
Period:	August 1990-June 1993
Funding:	\$98,696
Award:	Cooperative Agreement
Awardee:	The RAND Policy Research Center 1700 Main Street P.O. Box 2138 Santa Monica, CA 90407-2138
Project Officer:	Joel W. Greer, Ph.D. Division of Beneficiary Studies

Description: The project is an analysis of Medicare payments for physician supervision of dialysis of hospitalized patients before and after the April 1, 1988, policy change which allowed physicians to use dialysis procedure codes.

The study found that inpatient dialysis services provided by physicians to end stage renal disease (ESRD) beneficiaries increased from allowed charges of \$38.8 million in the 12 months before the policy change to \$62.8 million in the year after the change. Inpatient dialysis services increased from 12.7 percent of allowed charges for all inpatient physician services to over 16 percent. The increase comes from both increased charges per inpatient day and an increased number of hospitalizations. Physicians who received monthly capitation payments (MCP) had a 24.7 percent increase in their total allowed charges for inpatient services from the year before the policy change to the year after. The most conservative estimate of the amount resulting from the policy change is 4 percent. Average allowed charges for inpatient dialysis services were \$170 in 1988 whereas the average MCP payment for an entire month of outpatient care was \$173. The authors speculate that the large difference between these rates may be an incentive for physicians to provide services for ESRD beneficiaries in the inpatient setting.

The final report entitled "Patterns of Inpatient Physician Services for End Stage Renal Disease Beneficiaries" may be ordered from RAND.

Designing a Study of Components of the Dialysis Monthly Capitation Payment

Project No.: 99-C-98489/9
 Period: September 1990-August 1991
 Funding: \$50,443
 Award: Cooperative Agreement
 Awardee: The RAND Policy Research Center
 Project Officer: Lawrence E. Kucken
 Division of Beneficiary Studies

Description: The aim of this project was to develop a design for a study of the types, frequency, and settings of physician services provided to Medicare dialysis patients. In designing the study, RAND developed data collection and sampling strategies. The study design focused on three basic kinds of analyses: analysis of the care provided to dialysis patients, analysis of variations in the bundle of physician services provided, and analysis of selected outcome measures. The recommended study design involved collecting data from a probability sample of monthly capitation payment physicians using a log diary. Under this data collection approach, physicians would describe services rendered for a 3- to 4-day period with the start date randomly selected from the study year. These data are to be linked with Medicare billing data for further analysis. The report recommended a sample of 1,115 physicians.

The project report entitled "Measurement of Services Provided by Physicians under the Monthly Capitation Payment: A Proposed Study Design" is available from the National Technical Information Service, PB93-112738.

Staff-Assisted Home Dialysis Demonstration

Project No.: 500-87-0030/9
 Period: June 1991-December 1995
 Funding: \$914,203
 Award: Technical Support: Evaluation of Demonstrations
 Contractor: Abt Associates, Inc.
 55 Wheeler Street
 Cambridge, MA 02138-1168
 Project Officer: Bonnie M. Edington
 Division of Health Systems and Special Studies
 Mandate: Omnibus Budget Reconciliation Act of 1990 (Public Law 101-508)

Description: This demonstration is to test whether providing Medicare-paid home hemodialysis assistants for end stage renal disease (ESRD) patients meeting stringent eligibility criteria (e.g., bed- or wheelchair-bound) is cost effective, in that it reduces Medicare-covered ambulance costs for transporting patients to maintenance dialysis in facilities or reduces hospital admissions attributed to transportation-related problems. The legislation limits the experimental benefit to a maximum of 800 patients and stipulates a detailed ratesetting formula.

Letters of solicitation were sent to all dialysis facilities in January 1992, and outreach efforts were undertaken in 1992 and 1993. However, as of the end of July 1993, only 75 patients were enrolled. Although the enrollment period was open through April 1994, it does not appear that this demonstration will have a sufficient number of patients for meaningful statistical analysis. Therefore, a series of related research studies will be undertaken. An interim report was submitted to Congress in January 1993. The final Report to Congress is due December 31, 1995.

Cost and Outcomes from Different End Stage Renal Disease Treatment Modalities

Project No.: 500-90-0050
 Period: September 1990-December 1992
 Funding: \$200,039
 Award: Contract
 Contractor: The University of Michigan
 315 Huron Street, Suite 240
 Ann Arbor, MI 48103
 Project Officer: Joel W. Greer, Ph.D.
 Division of Beneficiary Studies
 Mandate: Omnibus Budget Reconciliation Act of 1986 (Public Law 99-509)

Description: The purpose of this project is to study the cost effectiveness of various treatment modalities for end stage renal disease (ESRD).

The final report entitled "Cost Effectiveness of ESRD Treatment Modalities" has been received. As expected, transplantation improves survival and is the most cost-effective modality for all age, race, and cause of ESRD groups. Transplantation is not necessarily cost saving. It is cost effective because it has the lowest cost per day, but total costs are sometimes increased because of longer years of life. Center hemodialysis is more cost effective than continuous ambulatory peritoneal dialysis (CAPD) as patient age increases. However, for the youngest age group, CAPD is associated with longer survival. Home hemodialysis is generally not more cost effective than center hemodialysis because of higher costs. There are many qualifications that complicate the interpretation of these results.

Center Billings for Ancillary Dialysis Services

Project No.: 99-C-98489/9
 Period: August 1991-July 1993
 Funding: \$120,000
 Award: Cooperative Agreement
 Awardee: The RAND Policy Research Center
 Project: Joel W. Greer, Ph.D.
 Officer: Division of Beneficiary Studies

Description: Medicare pays a fixed amount—called the composite rate—for each dialysis session including supplies, drugs, and tests. There are ancillary tasks that could be considered as part of the dialysis session but may be billed separately at times. Researchers will compile a list of these ancillary services and examine the current quantity and costs of supplies, drugs, tests, and services provided to dialysis patients supplementary to those covered in the composite rate.

Rates of Inpatient and Outpatient Shunt Procedures for End Stage Renal Disease Beneficiaries

Project No.: 99-C-98489/9
 Period: August 1991-July 1993
 Funding: \$103,906
 Award: Cooperative Agreement
 Awardee: The RAND Policy Research Center
 Project: Joel W. Greer, Ph.D.
 Officer: Division of Beneficiary Studies

Description: The most frequent cause of hospitalizations among end stage renal disease beneficiaries is the insertion, repair, or replacement of the vascular access device, the so-called shunt. It is believed that some of these hospitalizations can be performed in an outpatient setting. The purpose of this study is to examine physician billings for shunt procedures for their dialysis patients and to examine cost differences between inpatient and outpatient settings.

The draft final report has been submitted. Approximately 85 percent of shunt creations and 75 percent of shunt complications are treated in an inpatient setting. Black

persons are over 50 percent more likely to have a shunt creation or complications controlling for age, the cause of renal failure and region of the country. Diabetics have a relative risk of shunt creation 33 percent higher than for other causes of renal failure which is presumably caused by the clinical complications of diabetes. The shunt creation rate was 36 per 100 beneficiaries of dialysis during 1990. Total allowed charges for physicians in 1990 were \$48.9 million. Inpatient covered charges for hospitalization considered primarily to be for a shunt-related procedure were \$272.8 million.

Review of the First Year of Medicare Coverage of Erythropoietin

Project No.: 500-90-0051
 Period: September 1990-December 1993
 Funding: \$401,099
 Award: Contract
 Contractor: The Johns Hopkins University
 Program for Medical Technology and
 Practice Assessment
 East Monument Street, Room 8061
 Baltimore, MD 21205
 Project Officer: Joel W. Greer, Ph.D.
 Division of Beneficiary Studies

Mandate: Omnibus Budget Reconciliation Act of 1986 (Public Law 99-509)

Description: The Health Care Financing Administration (HCFA) began covering human recombinant erythropoietin (EPO) in July 1989. Researchers have examined usage patterns, costs, outcomes, and cost effectiveness of EPO following its coverage by HCFA. Changes in morbidity as measured by hospitalizations are being analyzed.

Many interesting findings have been produced. Five papers have been published or accepted for publication in peer review journals. A final report summarizing the findings will be prepared. Principal findings are that EPO was accepted rapidly by dialysis providers and patients. Dosing was well below amounts used in clinical trials and the resultant increases in hematocrit were also below expectations. For-profit and freestanding dialysis facilities tended to provide EPO to a higher proportion of their patients, but to prescribe lower average doses.

Impact of Complicating Diseases on End Stage Renal Disease Outcomes and Costs

Project No.: 17-C-90082/3
 Period: February 1992-June 1994
 Funding: \$321,044
 Award: Cooperative Agreement
 Awardee: The Johns Hopkins University
 School of Medicine
 720 Rutland Avenue
 Baltimore, MD 21205

Project: Lawrence E. Kucken
Officer: Division of Beneficiary Studies

Mandate: Omnibus Budget Reconciliation Act of 1986 (Public Law 99-509)

Description: The purpose of this project is to examine patient and provider characteristics associated with complicating diseases within the end stage renal disease (ESRD) population, and the effects of these disease patterns on patient outcomes, utilization, and costs. The study design will involve longitudinal analyses of ESRD patients to determine risk factors associated with the onset of complicating illness and outcomes such as hospitalization and mortality. The study period covers the years 1984-1990 and will draw upon the ESRD Program Management and Medical Information System and other Medicare statistical files.

The data preparation stage for this project is nearly completed and descriptive analyses have begun.

Access to Kidney Transplantation: An Examination of the Decision to Transplant

Project No.: 99-C-98489/9
Period: September 1990-September 1991
Funding: \$112,252
Award: Cooperative Agreement
Awardee: The RAND Policy Research Center
Project: Paul W. Eggers, Ph.D.
Officer: Division of Beneficiary Studies

Description: The purpose of this project was to analyze the effect of the medical and social characteristics of both the organ donor and potential transplant recipient on the probability of receiving a kidney transplant.

RAND conducted a comprehensive examination of the medical and nonmedical reasons for placing or not placing a donated cadaver kidney into a particular individual when that individual was next in line to receive a transplant. Specifically, RAND identified the key factors that determine when an individual will receive a cadaver kidney at kidney transplant centers across the country. Analysis of data from four organ procurement organizations showed that the rate of acceptance and transplant, once a person reaches the top of the waiting list, is 12 percent. There is no difference between black and white persons in this rate of transplantation. The major reasons for not getting a transplant are a positive cross-match (donor not suitable for recipient), 43 percent, and donor preservation problems, 16 percent. Results from this study are included in: "Access to Cadaveric Kidney Transplantation " and may be ordered from RAND.

Access to Kidney Transplant Waiting List

Project No.: 99-C-98489/9
Period: August 1991-January 1993
Funding: \$135,884
Award: Cooperative Agreement
Awardee: The RAND Policy Research Center
Project: Paul W. Eggers, Ph.D.
Officer: Division of Beneficiary Studies

Description: RAND assessed the rate of referral to the transplant waiting list among end stage renal disease (ESRD) beneficiaries. This was accomplished by linking waiting list data from the United Network for Organ Sharing (UNOS) with the Health Care Financing Administration's ESRD Program Management and Medical Information System data. In addition, RAND assessed racial differences in the length of time from referral to the waiting list until transplantation.

From July 1, 1988, through November 1, 1991, there were 36,776 persons entered onto the UNOS kidney transplant waiting list. Of this number, 51.8 percent received a transplant, 12.7 percent were removed from the list (died, moved, refused, medical, or unknown reason), and 35.5 percent remained on the waiting list. Analyses confirm results from other studies about racial differences in waiting times to transplant. White persons waited an average of 10.7 months until transplant while black persons waited an average of 16.5 months. Results from this study are included in: "Access to Cadaveric Kidney Transplantation " and may be ordered from RAND.

Evaluation of Capitation Payment for End Stage Renal Disease Services

Project No.: 500-92-0023/03
Period: September 1992-December 1993
Funding: \$239,056
Award: Delivery order in a Master Contract
Contractor: The RAND Corporation
Project: Paul W. Eggers, Ph.D.
Officer: Division of Beneficiary Studies

Mandate: Social Security Act, section 1875

Description: The purpose of this project is to develop alternatives to capitating payments for services to end stage renal disease (ESRD) patients and to perform a preliminary evaluation of the financial implications of at least one such payment system on the Medicare ESRD program and on the health plan serving ESRD patients. The work addresses several considerations that are central to the design of a capitation payment system for ESRD services. These include incentives for appropriate service use, control of program costs, and patient and provider participation; selection of services to be included in the capitation; and methods to adjust capitation payments for financial risks.

End Stage Renal Disease Research Studies

Project No.: 17-C-90085/3-01
Period: February 1992-September 1994
Funding: \$450,000
Award: Cooperative Agreement
Awardee: The University of Michigan
Project Officer: Joel W. Greer, Ph.D.
Division of Beneficiary Studies

Mandate: Omnibus Budget Reconciliation Act of 1986 (Public Law 99-509)

Description: The purpose of this project is to perform cost studies of major issues for the end stage renal disease program. The main focus to date has been on dialyzer reuse. An extensive analysis for the period 1989-1990 among patients treated in freestanding dialysis units using primarily conventional dialyzers has found a statistical association of patient mortality and selected germicides compared to patients treated in dialysis units that do not reuse dialyzers. A paper entitled "Analysis of the Association of Dialyzer Reuse Practices and Patient Outcomes" has been submitted for publication in a professional journal.

Dialyzer Reuse: A Cohort Study

Project No.: 18-C-90045/3-02
Period: February 1992-February 1994
Funding: \$476,716
Award: Cooperative Agreement
Awardee: The University of Pennsylvania
School of Medicine
Philadelphia, PA 19104-6095
Project Officer: Joel W. Greer, Ph.D.
Division of Beneficiary Studies

Mandate: Omnibus Budget Reconciliation Act of 1986 (Public Law 99-509)

Description: The study is to determine the impact of reprocessing hemodialyzer membranes on the health status of end stage renal disease patients undergoing chronic hemodialysis in the United States using the 1986-1987 incident cohort.

Economic and Cost-Effectiveness Studies for the United States Renal Data System

Project No.: HCFA-IA-9305
Period: July 1993-June 1998
Funding: \$1,657,075
Award: Interagency Agreement
Awardee: The National Institute of Diabetes and Digestive and Kidney Diseases
Project Officer: Joel W. Greer, Ph.D.
Division of Beneficiary Studies

Mandate: Omnibus Budget Reconciliation Act of 1986 (Public Law 99-509)

Description: This interagency agreement (IAA) provides funds to the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) to cover the cost of having the coordinating center for the United States Renal Data System (USRDS) perform economic and cost-effectiveness studies. NIDDK awarded a contract to the University of Michigan to be the coordinating center for 5 years from July 1993 to July 1998. The IAA calls for the coordinating center to conduct cost or cost-effectiveness components for at least four existing data studies and for one special study focused on economic issues each year.

Medicare Beneficiaries Receiving Chronic Renal Dialysis Not Identified as Having End Stage Renal Disease

Project No.: HCFA-93-0979
Period: August 1993-May 1994
Funding: \$24,813
Award: Contract
Contractor: The Medical Technology and Practice Patterns Institute
2233 Wisconsin Avenue, Suite 302
Washington, DC 20007
Project Officer: Joel W. Greer, Ph.D.
Division of Beneficiary Studies

Mandate: Omnibus Budget Reconciliation Act of 1986 (Public Law 99-509)

Description: The Medical Technology & Practice Patterns Institute (MTPPI) has identified some Medicare beneficiaries who are submitting bills indicating they are receiving chronic renal dialysis but who are not identified as having end stage renal disease (ESRD). MTPPI will design algorithms to identify ESRD patients from Medicare dialysis bills based on accepted clinical practice. MTPPI will estimate the impact of these persons on ESRD program enrollment, incidence, demographic characteristics, and costs.

Appendix A

Glossary of terms

Access device - A piece of equipment or a mechanism designed to provide access to the patient's bloodstream (for hemodialysis) or to the peritoneal membrane (for peritoneal dialysis).

Agreement - A written document executed between an ESRD facility and another facility in which the other facility agrees to assume responsibility for furnishing specified services to patients and for obtaining reimbursement for those services.

Arrangement - A written document executed between an ESRD facility and another facility in which the other facility agrees to furnish specified services to patients but the ESRD facility retains responsibility for those services and for obtaining reimbursement for them.

Backup dialysis - A dialysis session furnished to an ESRD patient which is outside the patient's routine dialysis setting; e.g., a home patient dialyzing in the facility or an in-facility patient transferred to a backup facility.

Backup hospital - A hospital with which a dialysis facility has a written agreement under which inpatient hospital care or other hospital services are available promptly to the dialysis facility's patients when needed.

Cadaveric transplant - The surgical procedure of excising a kidney from a cadaver and implanting it into the patient.

Centers by number of transplants - Centers performing a specified number of transplants for the survey period.

Chronic maintenance dialysis - Dialysis regularly furnished to an ESRD patient in either a hospital-based, independent (non-hospital based), or home setting.

Continuous ambulatory peritoneal dialysis (CAPD) - A type of peritoneal dialysis in which the patient dialyzes at home, using special supplies, but without the need for a dialysis machine.

Continuous cycling peritoneal dialysis (CCPD) - A variant of CAPD in which a machine is used at home to make exchanges at night automatically.

Dialysis - A process of maintaining the chemical balance of the blood when the kidneys have failed; specifically, a process by which dissolved substances are removed from the patient's body by diffusion from one fluid compartment to another across a semi-permeable membrane. The types of dialysis currently used are hemodialysis, intermittent peritoneal dialysis (IPD), continuous ambulatory peritoneal dialysis (CAPD), and continuous cycling peritoneal dialysis (CCPD).

Dialysis center - A hospital unit which is approved to furnish the full spectrum of diagnostic, therapeutic, and rehabilitative services required for the care of ESRD dialysis patients (including inpatient dialysis but excluding transplantation). Services may be furnished directly or under arrangement with another approved provider.

Dialysis facility - A unit (hospital-based or freestanding) which is approved to furnish dialysis service(s) directly to ESRD patients.

Dialysis station - The treatment area which is designed and equipped to provide adequate and safe dialysis therapy, as well as privacy and comfort for patients.

Dialysis treatment - One session of dialysis, either in a dialysis facility or at home.

Dialysis treatments given (other than home) - The times dialysis machines were used in a dialysis facility to provide patient treatments.

Disposition of cadaveric kidneys - The final disposition of acquired cadaveric kidneys (e.g., transplanted, used for research, or discarded).

End stage renal disease (ESRD) - That stage of renal impairment which is irreversible and permanent and requires dialysis or kidney transplantation to ameliorate uremic symptoms and maintain life.

ESRD facility - See dialysis facility.

ESRD network - An approved organized group of ESRD providers in a designated area which, by their type and location and because of local referral patterns, collectively furnish the necessary care for ESRD patients in the population served.

ESRD patient - A person with irreversible and permanent kidney failure.

ESRD service - Treatment or care (e.g., dialysis, transplantation, supplies) usually rendered to those diagnosed as having ESRD.

Facilities/centers surveyed - Individual facilities/centers completing the annual ESRD Facility Survey form.

Hemodialysis - A method of dialysis in which blood from a patient's body is circulated through an external device or machine and returned to the patient's bloodstream. Such an artificial kidney machine usually is designed to remove fluids and metabolic end products from the blood stream by placing the blood in contact with a semi-permeable membrane which is bathed on the

other side by an appropriate chemical solution referred to as dialysate.

Home patients - Those patients who maintain their own dialysis equipment and/or supplies at home and perform their own treatment alone or with assistance of a helper.

Inpatient care only - A renal dialysis center which performs backup services for dialysis facilities and performs 20 percent or less of its dialysis on an outpatient basis.

Inpatient dialysis - Dialysis which, because of medical necessity, is furnished to an ESRD patient on a temporary inpatient basis in a hospital.

Intermittent peritoneal dialysis (IPD) - A procedure that introduces dialysate into the abdominal cavity to remove waste products through the peritoneum (a membrane which surrounds the intestines and other organs in the abdominal cavity). It functions in a manner similar to that of the artificial semi-permeable membrane in the hemodialysis machine.

In-unit (in-facility) patients - Those patients whose self-dialysis or staff-assisted dialysis is performed in a dialysis unit or facility.

Living-related donor transplant - The surgical procedure of excising a kidney from a living relative of the patient and implanting it in the patient.

Living-unrelated donor transplant - The surgical procedure of excising a kidney from a living person not related to the patient and implanting it in the patient.

Lost to followup (LTFU) - A category of patients whose current status is unknown to the facility which at one time had been dialyzing/following the patient.

Medicare ESRD beneficiary - A person qualifying for Medicare by means of the renal disease provision of the law.

Non-viable kidneys - Cadaver kidneys that are not suitable for transplantation (may be used for research or discarded).

Organ procurement - The process of acquiring donor kidneys.

Organ Procurement Agency (OPA) - An organization which performs or coordinates the performance of all the following services: harvesting of donated kidneys; preservation of donated kidneys; transportation of donated kidneys; and maintenance of a system to locate prospective recipients for harvested organs.

Outpatient dialysis - Dialysis furnished on an outpatient basis at a renal dialysis center or facility. Outpatient dialysis includes staff-assisted dialysis and self-dialysis.

Patients awaiting transplant - Patients who are medically able to receive a transplant, have given consent for a transplant, and are on an active transplant list.

Peritoneal dialysis - See intermittent peritoneal dialysis.

Program Management and Medical Information System (PMMIS) - A computer-based system containing medical and demographic data that deals primarily with current Medicare-eligible ESRD patients but also maintains historical information on persons no longer classified as ESRD patients by reason of death or successful transplantation. In addition, it contains information on ESRD facilities and facility reimbursement.

Provider number - A six-digit number assigned by HCFA for the purposes of identification and billing.

Receiving service - Patients who receive either kidney dialysis or kidney transplant services.

Renal dialysis center - See dialysis center.

Renal dialysis facility - See dialysis facility.

Renal network - See ESRD network.

Renal transplant center - A hospital unit which is approved to furnish transplantation and other medical and surgical specialty services for the care of ESRD transplant patients, including inpatient dialysis furnished directly or under arrangement.

Restarted dialysis - A category of ESRD patients who were on chronic maintenance dialysis, left that treatment category for reasons other than a transplant (e.g., recovered kidney function), then returned to dialysis.

Self-care services - Services provided by a dialysis facility or center to patients who have been trained to perform self-dialysis.

Self-dialysis - Dialysis performed with little or no professional assistance by an ESRD patient who has completed an appropriate course of training.

Self-dialysis patients - Patients who have been trained in dialysis techniques and dialyze themselves in a dialysis facility or at home with little or no professional assistance.

Self-dialysis training and home training - Programs that train ESRD patients to perform self-dialysis in a dialysis facility or at home with little or no professional assistance and train other individuals to assist patients in performing self-dialysis or home dialysis.

Special purpose facility - A renal facility which is approved to furnish dialysis at special locations on a short-term basis to a group of dialysis patients otherwise

unable to obtain treatment in the geographical area. The special locations must be either special rehabilitative (including vacation) locations servicing ESRD patients temporarily residing there, or locations in need of ESRD facilities under emergency circumstances.

Staff-assisted dialysis - Dialysis performed by the staff of the renal dialysis center or facility.

Started for first time ever - A category of ESRD patients who have been newly diagnosed as having ESRD and have been stabilized on dialysis. During the survey period, these patients began their initial course of staff-assisted chronic maintenance dialysis or completed a course of self-dialysis training and began dialyzing at home or self-dialyzing at a facility.

Survey period - The period January 1 through December 31 of each year for which all ESRD facilities must complete a HCFA-2744, ESRD Facility Survey.

Training services - See self-dialysis training and home training.

Transient patients - Patients who are treated by facilities episodically (less than 51 percent of the survey period); e.g., vacationers.

Transplant - The surgical procedure that involves excising an organ from either a cadaver or a living donor and implanting it in the patient.

Transplant center - See renal transplant center.

Transplants performed - The number of kidneys transplanted by donor source type; i.e., living-related, living-unrelated, or cadaveric.

Treatment setting - The type and location of the dialysis treatment being performed; i.e., self-dialysis (in-unit or home), self-dialysis training, or staff-assisted dialysis.

Appendix B

Entitlement provisions

The 1972 Amendments to the Social Security Act extended Medicare coverage to individuals with end stage renal disease beginning July 1973, the month the law became effective. End stage renal disease is that stage of kidney impairment which is irreversible, cannot be controlled by conservative management alone, and requires dialysis or kidney transplantation to maintain life.

As soon as an individual knows that he needs maintenance dialysis treatments, he should apply for Medicare at any social security office. Social Security representatives will help the applicant furnish all necessary information and answer questions he may have about the Medicare program. One of the essential forms to be completed will be a HCFA-2728, Chronic Renal Disease Medical Evidence Report. Notification of entitlement will be mailed later. If a person cannot come to the Social Security office, arrangements can be made so that a representative can visit the person to take an application.

When entitlement to hospital insurance (Part A) is established, the individual is automatically enrolled for supplementary medical insurance (Part B) to begin the same month, unless he specifies he does not want this coverage.

It is not in the best interest of most persons with end stage renal disease to decline Part B coverage because many renal services, such as outpatient dialysis treatments, are covered only under Part B. A person qualifying for Medicare by means of the renal disease provision is eligible for the full range of benefits available under the health insurance program, not just for those services relating to renal care.

Nature of 1978 amendments

The 1978 Amendments to the Social Security Act made a number of changes in the rules governing entitlement to Medicare based on end stage renal disease. The changes were designed to encourage self-dialysis and transplantation and to eliminate a number of inequities and difficulties that existed under previous law. The following changes became effective October 1, 1978:

- *Age 65 restriction removed*—Prior to October 1, 1978, persons 65 years of age or over were ineligible for Medicare based on end stage renal disease. This restriction has been eliminated.
- *Application requirement*—On claims for entitlement October 1, 1978 and later, an application must be filed, with retroactivity limited to no more than 12 months before the month of filing.
- *Early entitlement based on hospitalization for transplant surgery*—Entitlement may begin during a month in the qualifying period if, during that period, the individual is hospitalized for transplant procedures, and the transplant takes place no later than 2 months thereafter.

- *Waiver of qualifying period based on self-dialysis training*—The qualifying period is waived for persons who during the qualifying period participate in self-dialysis training and are expected to complete the training successfully and self-dialyze thereafter.
- *36 months of post-transplant entitlement*—Entitlement terminates 36 months (rather than 12 months, as under previous law) after the month in which an individual undergoes kidney transplantation.
- *No second qualifying period after termination of R-HI (health insurance based on entitlement because of renal provision of the law)*—An individual whose entitlement to Medicare on the basis of ESRD has ended will be re-entitled as of the month his new course of dialysis begins, subject to the filing of a timely application.

Requirements for eligibility

To qualify for Medicare under the renal provision, a person must have end stage renal disease and either: be entitled to a monthly insurance benefit under title II of the Social Security Act (or an annuity under the Railroad Retirement Act); or be fully or currently insured under Social Security (railroad work may count); or be the spouse or dependent child of a person who meets at least one of these last two requirements. There is no minimum age for eligibility under the renal disease provision. An application for Medicare must be filed (effective October 1, 1978).

When entitlement begins

Provided all eligibility requirements are met, a person's Medicare entitlement based on the renal provision of the law begins with one of four occurrences.

- The third month after the month in which a course of dialysis is initiated. For example, if a course was initiated any time during the month of January, the date of entitlement would be April 1 (Table B-1).
- If earlier, the month a course of maintenance dialysis begins if the individual participates within the waiting period in a self-dialysis training program in an approved facility and is expected to complete the training successfully and self-dialyze thereafter (effective October 1, 1978).
- If earlier, the month of transplant.
- If earlier, the month an individual is admitted to an approved hospital for procedures preliminary to a transplant, if the transplant takes place within the following 2 months. If the transplant is delayed more than 2 months, Medicare coverage will begin the second month prior to the month the actual transplant takes place, or, if earlier, the first day of the third month after maintenance dialysis began (effective October 1, 1978).

Table B-1**Effective date chart for patients applying for
end stage renal disease benefits**

Regular course of dialysis initiated	Date of entitlement
January	April 1
February	May 1
March	June 1
April	July 1
May	August 1
June	September 1
July	October 1
August	November 1
September	December 1
October	January 1
November	February 1
December	March 1

When entitlement ends

A person's entitlement to this provision terminates with the earliest of the following events:

- The day of death; or
- The last day of the 12th month after a person no longer requires maintenance dialysis treatments; or
- The last day of the 36th month after the month in which the individual receives a kidney transplant. If within 36 months after transplantation the person requires another transplant or returns to dialysis, there is no interruption in entitlement (effective October 1, 1978).

Appendix C

End stage renal disease data sources

Form title and number	Primary purpose	PMMIS function	Research potential
Institutional Provider Billing (HCFA-1450)	Billing	Dialysis incidence Inpatient stay diagnosis	Prevalence and outcome analyses, morbidity.
ESRD Transplant Information (HCFA-2745-U4)	Clinical information	Transplant incidence	Clinical research: Efficacy of treatment, prevalence, and outcome analyses.
ESRD Transplant Follow-up (no number)	Clinical rehabilitative information	Patient and graft survival and rehabilitation	Clinical research: Efficacy of treatment and outcome analysis.
ESRD Death Notification (HCFA-2746)	Death incidence	Death incidence, cause of death	Outcome analyses.
CRD Medical Evidence Report (HCFA-2728-U4)	Entitlement	Identification of primary disease and first date of treatment	Incidence and outcome analyses.
ESRD Facility Survey (HCFA-2744)	Number of Medicare and non-Medicare patients by modality	National overview of Medicare and non-Medicare patients by modality	Incidence, prevalence, and outcome analyses.
ESRD Beneficiary Selection (HCFA-382-U4)	Billing	Home dialysis	Prevalence and outcome analyses.

NOTE: PMMIS is Program Management and Medical Information System. HCFA is Health Care Financing Administration. CRD is chronic renal disease.

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